VETERINARY SCIENCE IN THE SOVIET UNION

REPORT OF A TECHNICAL STUDY GROUP

Agricultural Research Service

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREWORD

An Agreement, concluded on January 27, 1958, between the Governments of the United States of America and the Union of Soviet Socialist Republics, provides for exchanges in the cultural, technical, and educational fields during 1958 and 1959. This Agreement is regarded as a significant first step in the improvement of mutual understanding between the peoples of the two countries.

Agriculture, which plays an important role in the national economies of the two countries, was specifically included in the Agreement as a field for exchange of specialists. The United States Department of Agriculture accordingly sent to the Soviet Union in 1958 six technical study groups of specialists in the following subjects: Agricultural Economics; Agricultural Crops; Soil and Water Use; Veterinary Science; Mechanization of Agriculture; Cotton Growing and Plant Physiology. In 1959 it is planned to send three additional study groups in the following fields: Forestry, Lumbering, and Millwork; Sheep Raising; Biological Control of Agricultural Pests.

The Soviet Union in turn sent to the United States in 1958 six delegations of specialists in the following subjects: Farm Mechanization; Hydro-Engineering (Irrigation) and Reclamation; Animal Husbandry; Cotton Growing; Agricultural Construction and Electrification; Veterinary Science. In 1959 three additional Soviet teams are expected in the following fields: Mixed Feeds; Forestry, Lumbering, and Millwork; Horticulture.

Each United States exchange study group, on completion of its assignment, prepared a report for publication. This report of the exchange delegation of veterinarians was prepared by: J. J. Callis, Frank D. Enzie, A. H. Frank, and C. D. Van Houweling, Agricultural Research Service; Rue Jensen, Colorado State University; and W. A. Hagan, Cornell University.

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Report of a Technical Study Group

GENERAL RECEPTION AND OBSERVATIONS

The exchange delegation of six veterinarians visited in the Soviet Union for 34 days, including the day of arrival (July 24, 1958) and departure (August 26).

Our delegation was met at the Moscow airport by a group of All-Union Soviet Veterinary Officials, headed by A. A. Boyko, Chairman of the Veterinary Collegium of the Ministry of Agriculture, the highest veterinary official of the country. Accompanying him were A. F. Kharchenko, Head of the Division of International Cooperation of the Ministry of Agriculture, Prof. Ya. R. Kovalenko, Director of the All-Union Institute of Experimental Veterinary Medicine (VIEV), Prof. V. N. Syurin, Director of the State Scientific Control Institute for Veterinary Preparations (GNKI), and several lesser officials. Since none of these gentlemen spoke English, they were accompanied by A. A. Rogov, a young medical scientist who remained with us as our guide and interpreter throughout our stay in the country. With the group, also, was Cole Blazier, a representative of the American Embassy, who had been assigned as the liaison officer to our delegation and who traveled with us during part of our visit. He gave us substantial help and advice in our dealings with the Soviet officials.

The Russian group expedited our clearance of customs and arranged for cars to take us to the Hotel Moscow, where we remained during the first week, and to pick us up the following morning for our first conference at the Ministry of Agriculture. For the travels outside Moscow, the Ministry assigned Prof. Syurin as well as the medical scientist (referred to above) to serve as interpreter. These people made all arrangements with the local delegations that invariably met us at railroad stations and airports at all hours of the day and night. In general our hotel accommodations were reasonably good--the best, we are sure, that the places had to offer. The food was good and more than ample.

Besides time for visiting institutions in which we were interested, some time was set aside for seeing historic buildings, museums, and art centers. We were taken, as guests of the Government, to the theater, to ballet performances, and to athletic events. We visited the All-Union Agricultural and Industrial Exhibition in Moscow twice. This is something no future delegations should miss, for it gives a picture of present agricultural and engineering developments of the U.S.S.R. as well as elaborate exposition of Government aims for future development. Many exhibits make comparisons (usually in percentages, seldom in actual figures) between the progress made in recent years by the U.S.A. and the U.S.S.R. Rarely does the Soviet Union suffer from the comparisons, especially when the curve ends at some future date.

In a short visit in a foreign country, it is always difficult to know whether the impressions gained are accurate. This was especially true in Russia, a country so different from any we had previously known and in which the language is so difficult a barrier. Some of our initial impressions were considerably modified as we saw additional people and places. In the beginning, we had the feeling that much was being concealed from us; that we were seeing part of a show circuit in which all the actors had been coached in advance, and all the bad spots either hidden or cleaned up before our visit. We still believe that there was much of this. But later we felt that failure to show us things we asked to see was not so often a matter of concealing things as it was a matter of actually not having them to show.

We asked, without success, in various schools and research institutes to see their animal colonies and the quarters for their research animals. Finally, we realized that these institutes, which are mostly in cities, do not have such quarters, or at least they are seldom at hand. We learned, later, that some institutes have special farms, often

many kilometers away, on which experimental animals are kept. Other institutes make use of regional veterinary hospitals and facilities of state farms which, being Government owned, could easily be converted for such use at short notice. We could not understand why the veterinary schools had so little space and facilities for teaching clinical medicine and surgery until we learned that much of this is taught either at the meat combines (slaughterhouses) or on state and collective farms, where veterinary practitioners are usually located.

During free hours in the evenings and on Sundays, we found nothing to prevent our going where we wished and we made many short excursions. So far as we were aware, we were not under surveillance of any kind. None of us found any evidence that our rooms had been searched while we were away. We all carried cameras and took pictures freely. In the cities, we were frequently approached by people on the street. Many wanted to buy clothing, or to exchange rubles for dollars at rates several times the tourist rate. Some, however, wished to talk about us, our country, and what we thought of theirs. Sometimes people stopped us merely to shake hands. Most of these were younger people who had some knowledge of spoken English. The older people, including Government officials in all parts of the Union, rarely spoke English, German, or French.

ITINERARY AND SCHEDULES

The morning after our arrival in Moscow we met in the offices of the Ministry of Agriculture with the officials who had met us at the airport, to work out plans for our sojourn in Russia. A suggested itinerary, showing the institutions we wished to visit, had already been submitted to the Ministry.

Our travel schedule, as actually carried out, and the institutions we visited in the Soviet Union were as follows:

July 24 (Thursday)	Arrived at Moscow airport, 4:20 p.m.
July 25 (Friday)	Moscow.--Attended Conference at Ministry of Agriculture. In late afternoon attended a cocktail party at residence of American Ambassador.
July 26 (Saturday)	Moscow.--Visited the All-Union Agricultural and Industrial Exhibition. In afternoon, met Mr. Boyko, who gave us a general review of the animal-disease situation in Russia. Attended soccer game in evening at Lenin Stadium.
July 27 (Sunday)	Moscow.--Rest day. Visited downtown Moscow, the Kremlin, and the University of Moscow. In the evening, attended the track meet between the Americans and the Soviets at Lenin Stadium.
July 28 (Monday)	Moscow.--Spent entire day at the All-Union Institute of Experimental Veterinary Medicine (VIEV). In evening, attended ballet performance.
July 29 (Tuesday)	Moscow.--Spent entire day at the Moscow Veterinary Academy.
July 30 (Wednesday)	Moscow.--Spent entire day at the State Scientific Control Institute for Veterinary Preparations.
July 31 (Thursday)	Moscow.--Visited the All-Union Scientific Research Institute of Veterinary Sanitation and Ectoparasitology until midafternoon. Toured one of the city markets where farmers sell their produce, including meat and milk, on the free market. Still later, visited one of the 13 hospitals for small animals located in the city. At 11 p.m., left for Kursk by train.
August 1 (Friday)	Kursk.--Visited the biocombine (all-day visit, after a late start).
August 2 (Saturday)	Spent day traveling, in cars supplied by the Ministry of Agriculture, to Kharkov, a distance of about 300 kilometers.

August 3 (Sunday) Kharkov.--Rest day. Toured city during day and attended a gypsy song-and-dance show in the evening in an open-air amphitheater.

August 4 (Monday) Kharkov.--Visited the Ukrainian Institute of Experimental Veterinary Science during the forenoon and part of the afternoon. In late afternoon, visited the Kharkov Zootechnical Institute.

August 5 (Tuesday) Kharkov.--Visited the Kharkov Research Institute of Animal Husbandry of Forest, Steppe, and Woodland Regions of the Ukrainian S.S.R. (an all-day visit).

August 6 (Wednesday) Kharkov.--Traveled in cars to the Bogodukhovsky Raion, about 60 kilometers from Kharkov, to visit a regional veterinary diagnostic laboratory, a regional veterinary hospital, and a collective farm ("Rodina").

August 7 (Thursday) Left by plane for Tbilisi. Should have arrived in late afternoon but plane was grounded by bad weather at Kutaisi; remained overnight there.

August 8 (Friday) Tbilisi.--Arrived at 8:30 a.m. After a late start, spent remainder of day at the Georgian Research Institute of Animal Husbandry and Veterinary Science. In late afternoon, visited a state farm.

August 9 (Saturday) Tbilisi.--In the morning, visited the Georgian Zooveterinary Institute; in the afternoon, another state farm. In the evening, attended a banquet at the restaurant in Stalin Park.

August 10 (Sunday) Rest day. Taken on all-day ride up the old Military Road into the Caucasus. Saw some of the pasture lands in the mountains of the Diesheti Region. Back to Tbilisi in time to catch night train for Gagry, in West Georgia.

August 11 (Monday) Gagry.--This was an unscheduled side trip, since the jet plane for Tashkent flies only every other day and we could not leave until Tuesday. Arrived early in the morning. Delegation with cars took us to inspect two state farms, then to see mountain scenery and some of the resthouses on the shore of the Black Sea. Took midnight train for Tbilisi.

August 12 (Tuesday) Tbilisi and Tashkent.--Arrived at Tbilisi in early afternoon. Took jet plane at 8 p.m. for Tashkent; arrived late and stayed overnight.

August 13 (Wednesday) Alma-Ata.--Departed by plane at 9:20 a.m. for Alma-Ata. Arrived about noon. Spent afternoon at the Kazakh Veterinary Research Institute. In late evening rode into foothills of the mountains overlooking the city.

August 14 (Thursday) Alma-Ata.--Visited the Alma-Ata Zooveterinary Institute in the forenoon and the Alma-Ata Biocombine in the afternoon.

August 15 (Friday) Alma-Ata and Frunze.--In the forenoon most of the delegation visited the Institute of Zoology of the Kazakh Academy of Sciences; Van Houweling visited meat combine (abattoir) instead. At 2 p.m., took plane for Frunze. In afternoon, heard a general briefing on veterinary matters and animal husbandry of Kirgizia by the Vice Minister of Agriculture, who is a veterinarian. In late afternoon, were taken on a tour of the city, then to a hall where a 2-hour color film on the livestock industry of the Kirgizian Republic was shown.

August 16 (Saturday) Frunze.--First visited the artificial insemination center, known as the Kirgizian Republic Station for Pure Breeding Cattle. Later visited the Kirgizian Republic Veterinary Laboratory. In the evening, visited an agricultural fair that was

August 16 (Saturday)	about to open; later, visited a nearby state farm.
August 17 (Sunday)	Long tiresome trip by propeller plane to Moscow (13-1/2 hours).
August 18 (Monday)	Moscow.--About noon, received word from Ministry of Agriculture that Omsk trip had been called off. Visited Moscow Agricultural and Industrial Exhibition that afternoon for second time.
August 19 (Tuesday)	Leningrad.--Took plane to Leningrad; arrived about noon. After lunch, visited Winter Palace and the Hermitage Art Museum.
August 20 (Wednesday)	Leningrad.--Visited the Leningrad Veterinary Institute.
August 21 (Thursday)	Leningrad.--Visited the Leningrad Scientific Research Veterinary Institute. In late afternoon, visited Peterhof, the summer home of Peter the Great.
August 22 (Friday)	Visit to collective farm.--Were told at 10 o'clock that collective farm we planned to inspect had canceled our visit because another delegation was expected. We requested that another farm be found, preferably an average one rather than the type of show places we had been shown previously. Finally arrangements were made to visit such a place on the Karelian Isthmus near the Finnish border, about 80 kilometers away. Reached farm ("Sunrise of Communism") in early afternoon, visited for about 6 hours then returned to Leningrad. Took train for Moscow about midnight.
August 23 (Saturday)	Moscow.--Visited the Lenin All-Union Academy of Agricultural Sciences, where Professor Skryabin, the helminthologist, presided. Then adjourned to the Skryabin All-Union Institute of Helminthology where we visited until midafternoon. Van Houweling conferred with the Chief of the Plant Protection Service of the Ministry of Agriculture.
August 24 (Sunday)	Rest day. All went shopping at GUM, Moscow's large department store. Boat ride for some of us in the later afternoon.
August 25 (Monday)	Moscow.--Went to the Ministry of Agriculture at 10 a.m. for our final conference with Government officials.
August 26 (Tuesday)	Departed from Moscow for home at 1:50 p.m.

ORGANIZATION OF THE RUSSIAN VETERINARY SERVICES

The organization of the veterinary services of the U.S.S.R. is complicated and difficult for us to understand, particularly the relationship of the supply and field disease-control services to education and research. An organization chart taken from a book given us by the Ministry of Agriculture (fig. 1) helps to clarify at least part of the situation. Although this chart does not include veterinary education, it is our understanding that this activity is a function of the Ministry of Agriculture; this is in line with general Soviet policy of having the technical and professional schools administered by the Ministry which they principally serve rather than by the Ministry of Education.

The chief veterinary administration in the Ministry of Agriculture is known as the Veterinary Collegium. This body has administrative responsibility for all field veterinary services of the U.S.S.R. The responsibilities are passed down through similar bodies established by each of the constituent Republics; these, in turn, exercise responsibility for provincial, district, and municipal services. Directly under the Collegium are the All-Union Trust of the Biological Industries, which controls the making of all biologic products used in the Union; the All-Union Trust for Animal Husbandry and Veterinary Supplies, which manages the manufacture and supply of instruments, drugs, and other supplies

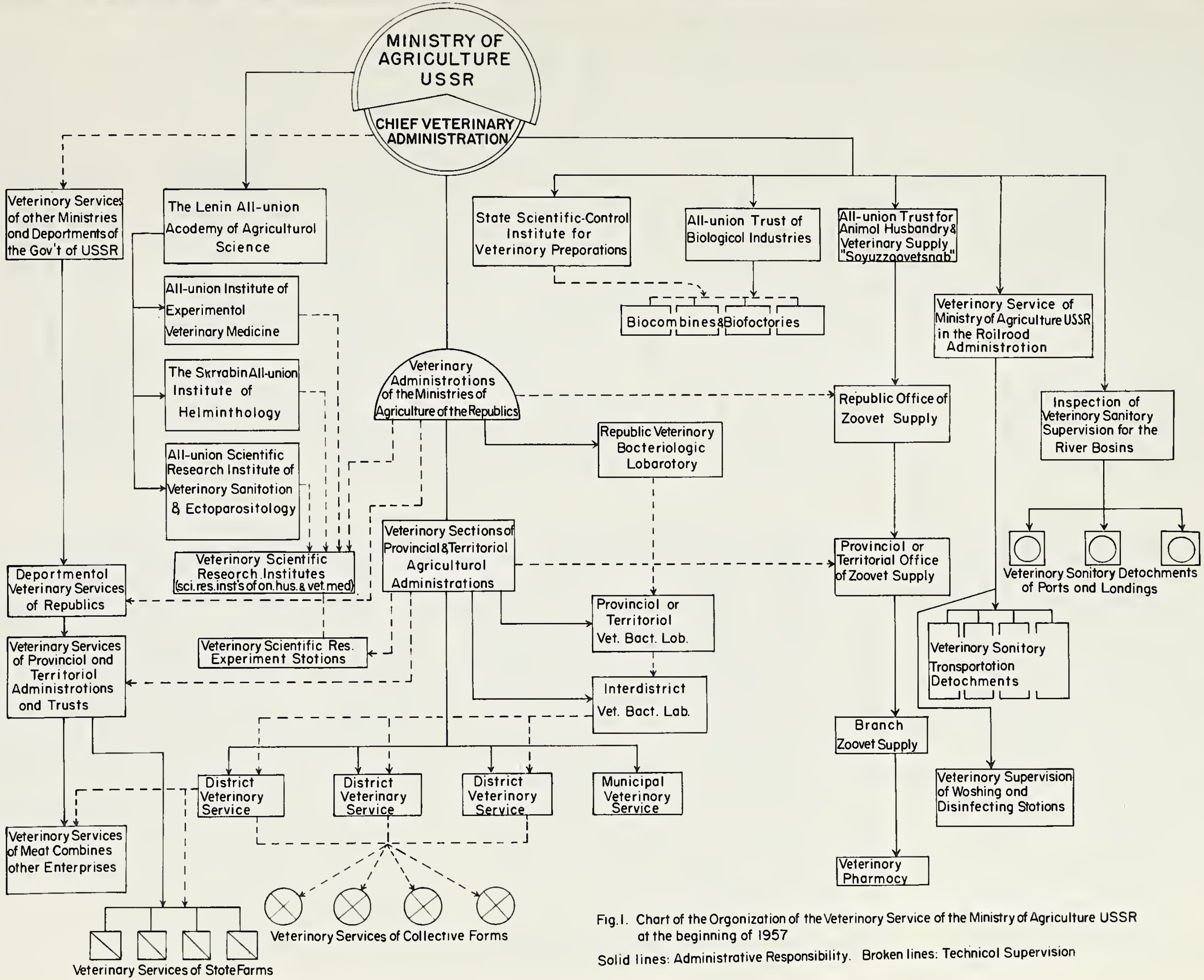

Fig. 1. Chart of the Organization of the Veterinary Service of the Ministry of Agriculture USSR at the beginning of 1957

Solid lines: Administrative Responsibility. Broken lines: Technical Supervision

required in veterinary services; and the State Scientific Control Institute for Veterinary Preparations (GNKI), which is charged with technical supervision of the laboratories and factories of the All-Union Trust of the Biological Industries, to assure that all products offered for use meet established standards of excellence.

On the other hand, scientific research in veterinary medicine at the All-Union level is not a responsibility of the Veterinary Collegium but of the Ministry itself, which exercises control through the Lenin All-Union Academy of Agricultural Sciences. This Academy is directly responsible for three large national research institutes in Moscow--the All-Union Institute of Experimental Veterinary Medicine (VIEV), the Skryabin All-Union Institute of Helminthology (VIGIS), and the All-Union Scientific Research Institute of Veterinary Sanitation and Ectoparasitology. These institutions, in turn, exercise technical supervision over similar research institutes in the several Republics.

THE VETERINARY PROFESSION IN THE SOVIET UNION

As all professional organizations have been abolished in the Soviet Union, there are no national or even republic veterinary medical societies. There are, however, organizations in the sciences that underlie medicine, such as pathology, pharmacology, helminthology, and physiology.

Mr. Boyko told us that there are 42,040 veterinarians in the Soviet Union and that 39,655, or about 95 percent, work on state and collective farms and in regional laboratories and hospitals. Between 30 and 40 percent are women. In addition, there are 49,790 "feldshers," or veterinary assistants, who are not as highly trained as veterinarians; nearly all of them work on state and collective farms. Every state farm has at least one veterinarian; every collective farm has at least one feldsher. The large farms may have several of each.

We inquired about the social standing of veterinarians in the Soviet Union and their compensation. We were assured that veterinarians enjoy social status equal to that of other professions and that their compensation is about the same.

After being graduated from a veterinary school and passing certain qualifying examinations, the young graduate is usually assigned to a farm job, often under an older, more experienced man at first. He has no special title. His compensation apparently varies in different areas, as the figures given us ranged from about 800 to 1,350 rubles per month. The official (and unrealistic) exchange rate is 25 cents per ruble. However, the tourist exchange rate is 10 cents per ruble. The latter rate is more in line with prices paid for items in the United States.

As the graduate acquires experience, his salary increases; but on the whole, his economic position in his early years appears to be only slightly better than that of of an average laborer. If he is on a collective farm, he may participate in the farm profits and thus augment his salary. Some of the field veterinarians have opportunities to attend special courses given by certain veterinary colleges, especially the Leningrad Veterinary Institute, which gives instruction to about 1,500 veterinarians each year. The diagnostic services of the regional laboratories and the advice of the regional and state veterinary officials are available to them.

A veterinarian who desires a career in research or Government work must generally obtain a position as assistant in one of the research institutions. In 2 or 3 years, he may be able to present a satisfactory thesis and pass a comprehensive examination given by a governmental board. These qualifications entitle him to the degree of candidate of science. His salary will be about doubled and he can look forward to larger opportunities.

The title of doctor of science is given to a much smaller number of persons who, after long periods of meritorious service (sometimes 10 years or longer), present especially worthwhile theses and pass rigid examinations administered by a governmental board. The doctorate is highly coveted because of its prestige, because it almost doubles the previous salary, and because such a title is needed to become eligible for a professorship in a research or teaching institution. The title of professor is held by some persons who have never been associated with an institution of higher learning except in the capacity of a student.

VETERINARY EDUCATION

The U.S.S.R. trains a large number of veterinarians for employment at state and collective farms, diagnostic laboratories, food-inspection stations, and research and teaching institutions. Thirty-four schools, widely distributed geographically, are operating. We visited the following four: Moscow Veterinary Academy, the Georgian Zooveterinary Institute, the Alma-Ata Zooveterinary Institute, and the Leningrad Veterinary Institute. Some schools of veterinary medicine are combined with zootechnical institutes for the training of veterinarians and zootechnicians (animal husbandmen). Three of the four schools we visited are combined with zootechnical institutes, and the fourth is considering relocation and union with a zootechnical institute. These four institutions were in major cities that are in centers of large livestock populations and may be, as claimed by the administrators, among the best veterinary medical institutions of the country.

Faculty

Veterinarians, as well as nonveterinary medical specialists such as microbiologists, parasitologists, and chemists, are employed to teach and conduct research. While some teaching personnel possess only diplomas for basic training, many have the candidate of science degree; a few, including all full professors, have the doctor of science degree. The primary function of the faculty is to instruct students. Research projects are conducted during summers while students are on vacation. The results of scientific investigations are published in book form by the individual institutions.

The faculties are large enough to give considerable individual attention to students. The following table presents the number of students and faculty members as well as the faculty-student ratios of the veterinary medical institutions we visited:

	Students	Faculty	Ratio of faculty to students
Moscow Veterinary Academy.......	2,000	210	1:10
Georgian Zooveterinary Institute..	350	75	1:5
Alma-Ata Zooveterinary Institute.	1,125	173	1:7
Leningrad Veterinary Institute....	500	138	1:4

Departments

Some of these institutions have as many as 35 departments. These include departments of anatomy, physiology, microbiology, and surgery. In addition, smaller segments of a science are given departmental status. These include departments of ectoparasitology, protozoology, virology, diseases of horses, diseases of cattle, diseases of chickens, diseases of sheep, and ancillary subjects in animal husbandry. Each department is directed by a person having the title of Department Head.

Undergraduate Training

Students

As indicated in the tabulation above, large numbers of new students are admitted annually to veterinary medical institutions. The Moscow Veterinary Academy admits 400 new veterinary medical students annually. Students at most institutions come from the Republic in which the school is located, but some come from other Republics of the U.S.S.R., from China, and from other communist countries. There is considerable competition for admission to such schools and admissions are based on previous scholarship records and examination ratings. At the Alma-Ata Zooveterinary Institute, a class of 225 new students is selected from approximately 1,300 applicants.

From 20 to 30 percent of each class are women students. During World War II and for a few subsequent years, 50 to 60 percent of each class were women. Women as students are not discriminated against.

No student is excluded because of personal inability to finance his education. Instruction and lodging are provided without cost. Food and clothing must be purchased by the student. Needful students receive a stipend which is sufficient, when properly managed, to purchase food and clothing. Additional student income can be obtained through special scholarship grants and through employment during summer vacations. Students whose parents are financially able to provide assistance do not receive Government stipends.

Curriculum

The curriculum is uniform for all schools of veterinary medicine throughout the

U.S.S.R. Minimum training is as follows:

Preprofessional education:
- Primary grades .... 7 years
- Secondary grades or middle school .... 3 years
- Professional education .... 5 years

Students of unusually high scholarship may go directly from completion of the secondary grades (middle school) to professional veterinary medical training. Such students are few and are selected on the basis of highly competitive examinations. Students of average scholastic ability must obtain several years of practical training on a farm before applying for admission to a school of veterinary medicine. Admission of these students is not on a competitive basis, but each applicant must pass formal entrance examinations.

The following courses are studied during the 5 years required for professional training:

First year.--Physics, chemistry, zoology, biology, and anatomy.

Second year.--Anatomy, histology, physiology, organic chemistry, biochemistry, microbiology, animal breeding, and animal husbandry.

Third year.--Pathology, clinic, pharmacology, and obstetrics.

Fourth year.--Internal diseases, surgery, epizootiology, and parasitology.

Fifth year.--Some courses of fourth year continued; organization of services, jurisprudence, economics of animal husbandry, radiology, diseases of small animals, diseases of bees, and diseases of fish.

For training in basic sciences, classes are divided into sections of 12 to 25 students for lectures and laboratory studies. Both laboratories and lectures utilize numerous visual aids. Laboratory rooms are small and, at the time of our visit, contained equipment of minimum standard in quantity and quality. Laboratories were not in session during our visit, but we were given the impression that laboratory exercises are demonstrations by the instructor.

Hospital facilities for both large and small animals are meager. Clinical courses utilize school hospitals, abattoirs, regional hospitals, and regional laboratories for training. School hospitals receive and treat sick animals only during months of school instruction. Hospital administrators indicated that horses and cattle, in approximately equal numbers, constitute the majority of cases treated. A small-animal clinic is maintained.

Students perform minor surgical operations at abattoirs on animals submitted for slaughter. Operations performed under these circumstances include dehorning, castration, neurectomy, eye ablation, rumenotomies, and Caesarean sections. Anesthetized animals are not slaughtered until several days after administration of anesthetic.

During the fourth and fifth years and the intervening summer, each student is assigned for 4 months to a regional hospital or farm where he receives training from the local veterinarians. Faculty members do not accompany their students.

On satisfactory completion of 5 years of professional training, as determined by comprehensive examinations at the end of each school year, the student receives a diploma that qualifies him to be examined by the Ministry of Agriculture for licensure to accept employment as a veterinarian. Approximately 3,500 students are graduated annually.

Graduate Training

The degree of candidate of science in veterinary medicine requires approximately 3 years of study in a veterinary medical school; and the degree of doctor of science in veterinary medicine generally requires from 5 to 10 years of study. Graduate study contains a minimum of formal course work. Emphasis is on a research problem in which the student prepares and defends a thesis. The doctor of science degree conveys honor and helps to qualify the recipient for full professorship on a teaching or research faculty.

Physical Facilities

Separate buildings are provided for basic sciences and for clinics. While actual floor space seems adequate, laboratory equipment for basic sciences, radiology, and surgery is deficient. Several schools, however, indicated that plans were being made to improve laboratory facilities.

Institutional libraries are well supplied with publications in Russian. Many German, French, British, and American periodicals are subscribed to. The American Journal of Veterinary Research and the American

Veterinary Medical Association Journal are popular and frequently used.

Textbooks

Eminent professors prepare manuscripts for textbooks. These are submitted to a central governmental agency for approval. Several textbooks in the same science may be approved for use. Instructors select one or more textbooks from approved lists. Textbooks of American origin are not in use.

Income of Veterinarians

Income varies directly with amount of training, experience, and competence. At the Moscow Veterinary Academy, salary schedules were estimated as follows:

Credentials required	Rubles per month
Diploma only	1,350
Diploma plus candidate of science degree	2,800-3,200
Diploma plus candidate of science degree plus doctor of science degree	4,500-5,000

Feldshers

Veterinary assistants with specialized training are designated "feldshers." They receive approximately 3 years of practical training in schools of veterinary medicine. There are approximately 49,000 feldshers in the entire country. Feldshers who demonstrate a high degree of competence and aptitude may return to a school of veterinary medicine to receive full veterinary medical education.

VETERINARY MEDICAL RESEARCH

Research in animal diseases is conducted in veterinary medical schools and research institutes, some of which are directed by the Lenin All-Union Academy of Agricultural Sciences, and others by the Soviet Ministry of Agriculture and the academies of the Republics comprising the U.S.S.R. Policies pertaining to control, eradication, and research in animal diseases are probably made by the Veterinary Collegium of the Soviet Ministry of Agriculture. However, the Soviet Union is a large country and has many types of climate and a variety of animal-disease problems. Policies vary, therefore, according to local conditions.

We did not observe formal experimentation on large animals with controls at any of the research institutes we visited. In experimental design, little or no attention is given to organize experiments that will yield maximal information or data having tested reliability.

The Lenin All-Union Academy of Agricultural Sciences has six departments, as follows: (1) Animal Husbandry (Zootechnical and Veterinary), (2) Forests, (3) Mechanization, (4) Hydrotechnics, (5) Economics, and (6) Electrification.

In addition to the Lenin All-Union Academy of Agricultural Sciences, there are Republic Academies of Science in the Ukraine, White Russia (Belorussia), Kazakhstan, Uzbekistan, Turkistan, Georgia, and Azerbaijan.

The Soviet Union has 158 agricultural scientific institutes, 650 experiment stations and field laboratories, 99 agricultural schools, and 34 veterinary schools. Veterinary and animal husbandry schools and ancillary institutes have a total of 30,000 teachers and scientists; of this total 14,247 are teachers.

The veterinary schools and institutes studying and producing serums and vaccines are also under the direction of the Veterinary Collegium of the Ministry of Agriculture. All veterinary research institutes in the various Republics are permitted to plan their own work provided it is in compliance with principles established by the Veterinary Collegium of the Ministry of Agriculture.

The three principal veterinary research institutes in the Soviet Union under direction of the Lenin All-Union Academy of Agricultural Sciences are the All-Union Institute of Experimental Veterinary Medicine (VIEV), the Skryabin All-Union Institute of Helminthology (VIGIS), and the All-Union Scientific Research Institute of Veterinary Sanitation and Ectoparasitology.

We visited all three. Descriptions of these institutes and others we visited follow.

All-Union Institute of Experimental Veterinary Medicine (VIEV)

VIEV, located 30 kilometers from Moscow on lands and in buildings formerly belonging

to a Russian duke, has been in existence for approximately 40 years.

The institute comprises 18 different disciplines referred to as laboratories, which are housed in 2 buildings on the station. In many instances, space allotted to each discipline consists of an office for the chief and one or two laboratory rooms. The buildings are old but in good repair. They are modestly equipped and lack adequate facilities for housing even small animals. No facilities for large animals are provided; experimental work requiring large animals is conducted at abattoirs and at state or collective farms, depending on the specific problem.

This institute also operates two branch laboratories--one at Ostrov Lisiy, almost equidistant between Moscow and Leningrad, and the other at Izhma in the northern part of RSFSR. The facilities at Ostrov Lisiy are used at infrequent intervals for work with foot-and-mouth disease (FMD) and hog cholera, and the laboratory at Izhma is used to study diseases of reindeer.

The total staff at the main laboratory and the two branches number about 400, including 20 at Ostrov Lisiy and 19 at Izhma. The staff includes 18 doctors of veterinary medicine, 56 candidates of science, and 36 scientists with diplomas. The remaining members of the staff are animal caretakers, technicians, laborers, and the like.

The 18 laboratories at VIEV are as follows: (1) Microbiology, (2) Protozoology, (3) Pathology, (4) Physiology, (5) Pharmacology and Pharmacotherapeutics, (6) Virology, (7) Physiology and Pathology of Reproduction, (8) Zoohygiene, (9) Antibibiotics, (10) Diseases of Cattle, (11) Diseases of Swine, (12) Diseases of Horses, (13) Diseases of Poultry, (14) Brucellosis, (15) Foot-and-Mouth Disease, (16) Tuberculosis and Paratuberculosis, (17) Rickettsia and Tularemia, and (18) Clean-Animal Production. These are discussed in more detail later in this report.

Skryabin All-Union Institute of Helminthology (VIGIS)

VIGIS was organized by K. I. Skryabin in 1919, and work on the taxonomy of helminths is under the able and continuing guidance of this 80-year-old Academician. V. S. Yershov, a veterinarian, is now director of the institute. Initially the institute was concerned primarily with helminths of livestock; but later the work was expanded to include helminths of man, plants, and fish. The institute is comprised of eight laboratories:

(1) General Helminthology: A. M. Petrov, Chief. Prepare monographs on helminths of different host species and on various helminth genera.
(2) Experimental Treatment: D. N. Antipin, Chief and Deputy Director of Scientific Section of Institute. Striving for complete eradication of helminths.
(3) Helminths of Cattle, Sheep, and Goats: Ye. Ye. Shumakovitch, Chief.
(4) Helminths of Swine: V. S. Yershov, Chief and Director of Institute.
(5) Helminths of Birds: V. I. Petrochenko, Chief. Emphasize water fowl.
(6) Biochemistry and Physiology: O. I. Polyakova, Chief. Metabolism of Dictyocaulus filaria, Moniezia expansa, Fasciola hepatica, Ascaris lumbricoides, etc. Pathogenesis of Dictyocaulus.
(7) Plant Nematodes: T. S. Skarbilovich, Chief.
(8) Helminthological Museum: A. N. Chertkova, Chief.

Members of the institute work all over the U.S.S.R. on a variety of parasitological problems, both independently and in conjunction with parasitologists from institutes in the various Republics. Their extensive field trips as well as wide public interest in the problems account, in part, for the recognition Soviet investigators have attained in this field.

There are 40 scientists currently working in the 8 laboratories, and personnel at about 40 lesser institutes and experiment stations work under the supervision of the All-Union Institute. A farm for experimental animals is located about 35 miles from Moscow; and in addition, the staff members may make use of facilities at other laboratories throughout the Soviet Union. The present building, in a heavily populated area of Moscow, has been occupied since the institute was founded in 1919; but new laboratories are under construction at Cheremushky in the Lenin Hills section near Moscow University.

The institute has an excellent Helminthological Museum with numerous specimens attractively and effectively displayed. The collection contains helminths obtained in over 120,000 autopsies of various host species from all parts of the Soviet Union. In addition, many nematode specimens are obtained from various plants, particularly from agriculturally important crops.

All workers at the institute were very enthusiastic, and they were particularly interested in ascertaining the names of the leading workers in the United States who are engaged in work similar to their own. In this connection, they all expressed a very keen interest in corresponding and exchanging reprints with their counterparts in the U.S.A.

The All-Union Helminthological Society of the Academy of Sciences of the U.S.S.R. was organized by Skryabin a number of years ago. It is currently comprised of about 1,500 to 2,000 members, all dedicated to the Master's main objective--the dehelminthization of all Russia! All the helminthologists convened in Moscow in December 1958 to discuss their work. The All-Union Society coordinates all work in veterinary, medical, and plant helminthology.

All-Union Scientific Research Institute of Veterinary Sanitation and Ectoparasitology

The All-Union Scientific Research Institute of Veterinary Sanitation and Ectoparasitology was founded in 1955 and is located in the center of Moscow. Three separate institutes--the All-Union Institute of Disinfection and Sanitation (VNILVSD), the All-Union Institute of Toxic Fungi (VNILIYAG), and the All-Union Institute of Dermatology (GIVD)--were combined to form the present institute. It occupies half of a three-story building, the other half of which is occupied by the State Control Institute.

The All-Union Scientific Research Institute of Veterinary Sanitation and Ectoparasitology comprises nine laboratories, which supervise certain functions throughout the country, including research. They are as follows: (1) Veterinary Sanitation and Rodenticides, (2) Disinfection and Utilization, (3) Entomology and Insecticides, (4) Arachnology, (5) Milk and Meat Inspection, (6) Mycology, (7) Chemistry, (8) Mechanization, and (9) Isotopes.

Veterinary research is also conducted at serum- and vaccine-production laboratories strategically located throughout the Soviet Union. The nature of research work at such laboratories is confined to ways to improve methods of production or quality of a product. Some of these units, referred to in the Soviet Union as biocombines, have facilities for large animals, but none of these facilities seem to be adequate. As a result, that part of the work has to be done at abattoirs and at state or collective farms.

Many of the research institutes produce biologicals and pharmaceuticals for limited local use. However, if a product is to be distributed in other Republics, it must be licensed by the State Scientific Control Institute for Veterinary Preparations at Moscow.

Moscow Veterinary Academy

The Moscow Veterinary Academy, the largest veterinary school in the Soviet Union, was established primarily for instructing students in veterinary medicine and zootechnics. In addition to the educational responsibilities, limited research is conducted in radiology, bone repair, classification of tumors, and surgery. Special problems, usually involving difficult diagnoses, may be referred to the faculty by veterinary personnel in the Republic.

State Scientific Control Institute for Veterinary Preparations (GNKI)

The State Scientific Control Institute for Veterinary Preparations is located in Moscow. It is responsible for certifying to the quality of all veterinary preparations produced in the Soviet Union and is commonly referred to as the State Control Institute. A representative from this institute is stationed in each biological factory and is responsible for certifying that proper manufacturing and testing procedures have been followed. These representatives are veterinarians qualified to give instruction on the preparation of products produced in the factory.

New information concerning preparation of biological products is issued by the State Control Institute. These procedures may be developed through research at the institute, or from ideas developed at various research institutes or biological factories and approved by the State Control Institute. In instances where the control representative is not in a position to certify a product, the entire batch as well as the test data may be referred to the institute for determination.

As in many other institutes, no facilities for large animals are available; and the facilities at regional hospitals, abattoirs, state farms, or collective farms are utilized. The facilities at Ostrov Lisiy are used for testing foot-and-mouth disease vaccines.

The State Control Institute includes the following Laboratories: (1) Brucellosis Diagnostic Preparations, (2) Anthrax,

(3) Virus Diseases (this laboratory has a special electron-microscope section), (4) Erysipelas and Pasteurellosis, (5) Anaerobic Preparations, (6) Paratyphoid and Leptospirosis, (7) Chemotherapeutic Agents, (8) Biochemistry, (9) Bacterial Media Preparations, and (10) Experimental Antibiotics Research.

A total of 203 workers are employed at the institute. Of these, 32 are scientifically trained--8 are professors or doctors of science; 17 are candidates of science; and 7 are scientific workers with diplomas.

Kursk Biocombine

The Biological Factory (Biocombine) located at Kursk, as well as all similar units, is under the control of the All-Union Trust of Biological Industries of the Ministry of Agriculture and was established for production of serum and biological products. As a rule, the biocombine in a particular area is engaged in producing materials used only in that area. However, one biocombine produces the supply of some products for the entire country. After a product has been manufactured, tested, and certified, it is forwarded to supply houses for storage and distribution.

The following products are manufactured in the biocombine at Kursk: Tuberculin; mallein; components for CF test; fowl pox vaccine; Newcastle disease vaccine; FMD vaccine; paratyphoid serum; and hyperimmune serums (A, O, C) for FMD.

Ukrainian Institute of Experimental Veterinary Science, Kharkov

The Ukrainian Institute of Experimental Veterinary Science was established shortly after the Russian Revolution of 1917. Its two original research responsibilities were the study of glanders and anthrax, which were prevalent in the Soviet Union at that time. Through research, however, both diseases either have been eliminated or are controlled by vaccination. As the needs of agriculture in the Ukraine increased, the responsibilities of the institute were broadened, and additional laboratory facilities were provided.

Workers at the institute are now engaged in the following studies: (1) Electron microscopy, (2) poultry diseases, (3) parasitic diseases, (4) diseases of sheep, (5) insecticides and antibiotics, (6) sanitary and hygienic processes, (7) keeping qualities of frozen meat, (8) pasteurization of milk, and (9) atrophic rhinitis of swine.

Kharkov Zootechnical Institute

The Kharkov Zootechnical Institute, the oldest zootechnical school in the U.S.S.R., was established in 1849. At one time it was a veterinary school. It comprises 3,000 acres and is located about 20 miles from Kharkov. Its purpose is to train zootechnicians in animal-husbandry practices. As a part of the instruction course, limited research is conducted on mechanizing farm procedures and on improving breeds of cattle, swine, and horses. Facilities include a 3-story masonry building for lectures, laboratories, and offices. Adequate numbers of barns and other livestock sheds are available.

Kharkov Research Institute of Animal Husbandry of Forest, Steppe, and Woodland Regions of the Ukrainian S. S. R.

The Kharkov Research Institute of Animal Husbandry is divided into two parts. One is located in Kharkov, the other in the country, about 10 kilometers away. The latter is situated on approximately 7,000 hectares (17,000 acres) of land. Most of the work of this institute is directed toward improving breeds of cattle, sheep, and swine. In addition, some research is conducted on artificial insemination of these animals. Other work includes studies on the physiology of reproduction and studies on the chemistry of forage. The different breeds of livestock developed at the institute are described elsewhere in the report.

Georgian Research Institute of Animal Husbandry and Veterinary Science

Veterinary and Zootechnic faculties were combined in 1929 to form the Georgian Research Institute of Animal Husbandry and Veterinary Science. The 22 subdivisions of this institute are:

Veterinary Departments	Zootechnic Departments
Diseases of Cattle and Horses	Cattle Husbandry
Diseases of Small Domestic Animals (includes dogs and cats)	Sheep Husbandry
Diseases of Poultry	Swine Husbandry
Media Preparation	Poultry Husbandry
Bee Diseases	Bee Husbandry
Zoological Hygiene	Feeding of Animals

Veterinary Departments	Zootechnic Departments
Helminthology	Food Technology
Arachnology	Economics
Toxicology	Biochemistry
Pathological Anatomy	Artificial Insemination
Antibiotics	
Electron Microscopy and Microphotography	

This institute operates two substations in the Republic--one near Tbilisi, another 80 kilometers away--and a state farm in the vicinity of Tbilisi. The institute also is responsible for the artificial insemination of cattle on a large state farm nearby. Of the 188 staff members, 84 are scientifically trained. Of these, 44 are candidates of science, 5 are doctors of science, 19 are biologists, and 9 are veterinary scientists. Research is conducted to develop new breeds of sheep, cattle, and swine particularly suited for the climate of Georgia. Representatives of each species have been placed on state and collective farms. Research is also in progress on agalactiosis of sheep, pullorum disease of chickens, and brucellosis of sheep.

Georgian Zooveterinary Institute

The Georgian Zooveterinary Institute was founded about 25 years ago. It comprises 25 departments with 94 staff members, including 5 doctors of veterinary science, 3 doctors of agricultural science, 1 academician, 1 corresponding member of the Lenin All-Union Academy of Sciences, and 67 candidates of science. We did not learn of any research on animal diseases being conducted at this institute.

Kazakh Veterinary Research Institute

The Kazakh Veterinary Research Institute was established in 1912 and is the oldest establishment for studying animal diseases in the Republic. There are 11 laboratories in the structure at Alma-Ata, and the institute also operates experimental stations in rural districts. The institute has 345 employees, of whom 100 are scientists. In addition to conducting research, the institute is licensed to produce foot-and-mouth disease (FMD) vaccine for use in the Republic. The facilities for housing large animals under experimental conditions were the best observed in the Soviet Union, both in quality and capacity.

Alma-Ata Biocombine

The Alma-Ata Biocombine, established in 1931, manufactures serums for colibacillosis, hemorrhagic septicemia, and paratyphoid. Vaccines are produced for blackleg, bradsot, sheep pox, goat pox, pleuropneumonia in goats, lamb dysentery, and anthrax. The biocombine also produces diagnostic antigen for brucellosis.

Workers at the institute expressed the opinion that hemorrhagic septicemia may be caused by a virus; however, they offered no experimental data to support the belief. They also expressed the opinion that hemorrhagic septicemia vaccine is not of much value; however, as nothing else is available, it is used throughout the Soviet Union.

At this institute all serums are produced in water buffaloes, whereas at other biocombines in the Soviet Union, horses are used as serum donors. The staff commented that water buffaloes are more difficult to immunize than horses; however, they are more economical and seem to tolerate antigens more readily.

Alma-Ata Zooveterinary Institute

The Alma-Ata Zooveterinary Institute was established in 1929 and is comprised of a veterinary and zootechnical faculty of 173 staff members operating 35 departments. The institute also operates two large experimental farms near Alma-Ata on which are kept 35,000 sheep, 200 camels, 2,000 swine, 400 horses, and 2,000 cattle. We did not learn of any research in animal diseases in progress at this station.

Department of Parasitology, Institute of Zoology of the Kazakh Academy of Sciences

The Institute of Zoology of the Kazakh Academy of Sciences was perhaps the most interesting and unique institute we visited in the Soviet Union. Workers are engaged in studying, especially, the transmission of parasites from wild to domestic animals. Although the institute is relatively new, it is already engaged in extremely interesting and worthwhile studies. Wild animals ranging from small species of rodents to deer weighing 800 to 900 pounds are maintained for experimental purposes. The staff at this institute seems to be especially well-qualified, enthusiastic about their work,

and busily engaged. There are 28 scientific associates at this laboratory and a total staff of 60 workers. The scientists are all zoologists; there are no veterinarians.

Kirgizian Republic Veterinary Laboratory, Frunze

The Kirgizian Republic Veterinary Laboratory is responsible for directing the work of local and district laboratories. It was created in 1953 and is comprised of the following Departments: (1) Epizootiology, (2) Brucellosis, (3) Bacteriology, (4) Parasitology, (5) Toxicology, (6) Biological preparations, (7) Media preparations, and (8) Engineering.

Even though the laboratory is primarily responsible for diagnostic investigations, a few biological preparations are produced, including (a) an enzyme that causes fermentation of silage, (b) tissue stimulators, (c) Lactobacillus acidophilus preparations for digestive diseases of young animals, and (d) rodenticides. A new laboratory building is under construction and after completion will be used to expand research. The laboratory also operates a number of mobile laboratories, which follow the sheep and cattle herds on range in mountains during the summer months. These mobile laboratories are equipped for bacteriological and serological diagnoses. Equipment includes laboratory animals, an electric generator, steam sterilizer, hot air sterilizer, hot and cold water, and camping equipment for four employees.

Leningrad Veterinary Institute

Members of this staff are engaged in instructional work only.

Leningrad Scientific Research Veterinary Institute

This institute was established in 1898. The laboratory buildings were constructed in 1911. For many years this laboratory was the center of veterinary research in the Soviet Union. After the Revolution of 1917, the institute was divided into two parts. One part was moved to Moscow and is now known as VIEV; the other part, reduced to a regional laboratory, remained in Leningrad and is now engaged in research and diagnostic investigations plus production of a few special biological preparations. The veterinary laboratory serves 11 districts in the vicinity of Leningrad; it employs 61 people, 20 of whom are scientists. The institute also trains approximately 200 veterinarians a year in laboratory procedures. The institute is comprised of four departments: (1) Epizootiology, (2) Virology, (3) Microbiology, and (4) Parasitology. Three other similar laboratories in the Russian Federation are located in the Far East, Siberia, and Kazan.

ANIMAL DISEASES IN THE UNION OF SOVIET SOCIALIST REPUBLICS

For the following discussion relating to animal diseases in the Soviet Union and the progress that has been made in their control in recent years, we were wholly dependent, as we were in many other things in this report, on what we were told by the Government officials. Although we visited many farms and saw considerable numbers of cattle, swine, sheep, and poultry, obviously we could not learn about the disease situation by direct observation. We have no reason to doubt any of the statements given, neither did we have any way of confirming them. Perhaps some element of confirmation exists in the fact that we asked the same questions, in many instances, of different officials at different times and places and found the answers to be in general agreement.

Diseases of Viral Origin

The following diseases of animals caused by viruses were reported not to occur in the Soviet Union: Fowl plague, contagious ecthyma, viral ulcerative dermatosis of sheep, enzootic abortion of sheep, vesicular exanthema of swine, vesicular stomatitis, avian lymphomatosis, infectious bovine rhinotracheitis, and mucosal disease.

The following diseases occur: Hog cholera, Newcastle disease, rabies, foot-and-mouth disease, sheep pox, equine encephalomyelitis, infectious anemia, goat pneumonitis, canine distemper, fowl pox, and rinderpest. Rinderpest, however, was reported to be virtually eliminated. Atrophic rhinitis of swine, which is of unknown

etiology but may be caused by a virus, also occurs in the Soviet Union.

Hog Cholera

Outbreaks of hog cholera occur in the Soviet Union from time to time, usually on premises near large cities and most often in garbage-fed swine, although wastes are "disinfected" prior to feeding. We did not obtain a definition of the word "disinfected"; thus, we do not know whether chemical or heat sterilization was implied.

Vaccination is used where outbreaks occur. Several types of hog cholera vaccine are in use in the Soviet Union. One (glycerinized crystal violet vaccine) has been used extensively for the past 12 years. Virulent virus and serum are still used in some areas, but only on swine being fattened for slaughter. Serum and virus are used only with full knowledge and concurrence of the veterinary administrator of the Republic in which the farm is located. Two strains of lapinized virus are in use in the Soviet Union. One is an American strain, which the Soviets refer to as Rovac and which was adapted to rabbits by workers at Lederle Laboratories, Pearl River, N. Y. The other is of British origin and was adapted to rabbits by Hudson at Weybridge, England. The British strain is preferred to the American because there are reportedly fewer side reactions with it. Serum may be administered simultaneously with both products.

Prof. S. N. Muromtsev, Chief of the Microbiology Laboratory at VIEV, is using electron-microscopy techniques to study changes in red-blood cells from animals infected with hog cholera virus. This worker and his staff have produced micrographs of cells depicting nodules or pseudopods on the periphery. They think such changes are the result of hog cholera virus. In addition, these workers have photographed the virus of hog cholera in spinal fluid from infected animals. We were shown an electron micrograph containing particles that were reported to be those of hog cholera virus. Latex particles of several different sizes were included in the same field; and, by comparative measurements, the Russian workers have estimated hog cholera virus to be approximately 60 millimicrons in diameter. Other workers in the Soviet Union are using electron-microscopy techniques to differentiate red-blood cells of hog cholera-infected and normal animals. At one station, workers are attempting to propagate hog cholera virus in blood cultures.

Newcastle Disease

This disease was not known in the Soviet Union until 1942, when it was introduced by invading German armies; since then, it has spread throughout the country. It is reportedly well controlled by large-scale vaccination programs. Both living and formalin-inactivated vaccines are in use; however, less of the inactivated vaccine and more of the attenuated strains are used each year. Two attenuated strains are used extensively. One of the two strains was attenuated by Dobson in Great Britain and the other by Hitchner in the United States. Newcastle disease vaccines are administered by intramuscular injection and aerosols.

Foot-and-Mouth Disease

Foot-and-mouth disease (FMD) occurs in some parts of the Soviet Union annually. Complete control or eradication is difficult since it is endemic in at least three species of wild animals: goats, pigs, and saiga (Saiga tartarica). These three hosts inhabit mountainous areas of the Southern Republics and come in contact with or traverse common areas with sheep and cattle on summer pastures. The disease is usually mild in sheep and often is not noticed in this species. Infected sheep that are returned to the lowlands during the winter months transmit FMD to cattle and swine.

The three European types of FMD virus--A, O, and C--occur in the Soviet Union; however, type C is rarely encountered. Virus variants A_5 and O_2 account for most of the recent outbreaks.

FMD vaccine is produced in a number of laboratories, two of which we visited. The VIEV type of vaccine developed by Dr. L. S. Ratner and Dr. V. N. Gribanov is used most widely in the Soviet Union. Another type of vaccine developed by Dr. V. I. Kindyakov, Chief of the Foot-and-Mouth Disease Laboratory, Kazakh Veterinary Research Institute, Alma-Ata, is used in the Kazakh Republic. This vaccine differs from the VIEV type only in percentage of tissue concentration. The Russians frankly admit that immunity produced with any of the types of FMD vaccine in use in the Soviet Union does not last more than 7 months, and that workers are searching for a better product.

The virus from which FMD vaccine is manufactured is produced by inoculation of susceptible animals in the squamous epithelium of the tongue. In general, this type of work is done at a slaughterhouse since facilities are not available at laboratories where FMD vaccines are manufactured. Carcasses from animals that have served as virus donors are canned. Animals used for determining vaccine potency are challenged by inoculating them intradermolingually 20 days after vaccination. Workers at the biocombine in Kursk reported that most lots of vaccine protected approximately 85 percent of the animals against development of secondary lesions. The percentage of primary (local) lesions was somewhat higher.

Cattle are vaccinated for FMD throughout the Soviet Union. Sheep in an outbreak area are sometimes vaccinated, but swine are never vaccinated. Good protection following vaccination was reported in sheep.

The quantities of FMD vaccine produced annually depend on need. During 1957, seven to eight million doses of vaccine were produced and used, mostly in the Southern Republics.

Type specific hyperimmune guinea pig serums for typing FMD virus are produced for the U.S.S.R. at the biocombine in Kursk. New isolates of virus are supplied annually by GNKI in Moscow. Guinea pigs weighing approximately 500 grams each are used for production of complement and immune serums for typing. These animals are raised on the premises and fed special diets containing vitamins and green forage, when available. Complement and serums are lyophilized prior to storage or shipment and are considered to be potent for at least 1 year and probably longer. Products more than a year old, however, are usually not utilized.

Research on propagation of FMD virus by tissue-culture methods is just beginning in the U.S.S.R. The group at VIEV, working under the direction of Drs. Ratner and Gribanov, was the only one we visited that was propagating virus on outgrowths of renal epithelium. These workers, and also workers at the biocombine in Kursk and at the FMD laboratory at the Kazakh Veterinary Research Institute in Alma-Ata, were experimenting with propagation of virus using the Frenkel technique (cultures containing explants of squamous epithelium from bovine tongue). From the small number of cultures we observed at all three institutes, we assumed that the method is not used extensively; and the workers stated that difficulties had been experienced in producing virus by this method. According to Dr. Ratner, experimental lots of vaccine from virus propagated by both tissue-culture methods have been fabricated, but the immunogenic quality did not compare favorably with that produced from infected tongue epithelium.

Workers at the biocombine in Kursk have recently begun to study the Belin method of production of FMD virus, wherein the virus is produced in symbiosis with vaccinia virus. The workers had not yet formed an opinion concerning the merits of this method as compared with other methods.

When an outbreak of FMD occurs, the affected farm is immediately quarantined from surrounding premises, and all cattle in a buffer zone are vaccinated. If only one or a few animals in a herd are affected at the time the disease is diagnosed, the affected animals are slaughtered and the remaining animals are immediately vaccinated. If large numbers of animals are affected, the farm is quarantined and the animals are permitted to recover. No treatment, other than supportive, is used.

Dr. V. I. Kindyakov has been studying mutation of FMD virus at the Kazakh Veterinary Research Institute for approximately 20 years. He reports that repeated inoculation of both guinea pigs and cattle with the same type of virus over a period of time at intervals of several days, induces the virus to change spontaneously to another type. These changes have been observed with types A, O, and C of the virus in both guinea pigs and cattle. In guinea pigs, often as many as 30 inoculations were necessary to induce the virus to change to another type. On the other hand, in cattle, fewer inoculations--often as few as 4--induced the same changes routinely. Some of the Russian investigators were in sharp disagreement with Dr. Kindyakov in this regard and offered the opinion that his views were not shared throughout the Soviet Union. These same kinds of changes have been reported in the literature from other countries, especially from Germany.

The FMD vaccine produced at the biocombine in Alma-Ata is the unfiltered type and is the same in principle as the type developed at VIEV. It differs in that it contains 6 percent of virus instead of 3 percent. Bivalent vaccines contain 3 percent of each type of virus, while monovalent vaccines contain 6 percent of a single virus. The vaccine is administered intradermally

in 2-milliliter amounts and is reported to give immunity for 7 months under experimental conditions.

Workers in FMD do not think that animals previously infected become biological carriers and, for this reason, premises on which FMD occurs are quarantined for only 30 days following the outbreak. They feel that the stability of the virus in the dry form is the principal reason for continued outbreaks in certain areas as well as occurrence of the disease in wild animals.

Equine Encephalomyelitis

This disease occurs sporadically in the Soviet Union and is controlled through the use of vaccines. The disease is not identical with Borna disease nor with any of the American types. Workers at the Ukrainian Institute of Experimental Veterinary Science are conducting research with the virus, using electron microscopy techniques. Their efforts are directed toward photographing virus contained in red-blood cells from infected animals. They are also attempting to show differences in red-blood cells from normal and infected animals.

Infectious Anemia

This disease exists in some areas of the Soviet Union but is not considered to be a major problem. Workers at the Ukrainian Institute of Experimental Veterinary Science are conducting research with the virus to determine the role of insects in transmission of the disease. This group is also using electron microscopy techniques to photograph virus in red-blood cells from infected animals. We were shown electron micrographs of red-blood cells that contained spherical bodies resembling virus particles; however, the micrographs also contained other particles of varying sizes and shapes that had not been identified.

Goat Pleuropneumonia

In some parts of Central Asia, goat pleuropneumonia is commonly referred to as cibienyak. It exists in several of the Southern Republics but is particularly prevalent in Georgia. Sheep are vaccinated annually in areas where the disease is known to occur, with results that are reputed to be highly successful. Vaccine for pleuropneumonia in goats is produced in the lungs of young goats following intratracheal inoculations. The vaccine is inactivated and aluminum hydroxide-adsorbed. There is no diagnostic test for pleuropneumonia in goats. Diagnosis is based on clinical symptoms, history, and epizootiology of the disease. Mortality may be as high as 80 percent in unvaccinated animals. The virus will not infect other species of animals.

Rabies

Preventive measures are used to control rabies in the Soviet Union. Since 1955 a lyophilized rabies vaccine has been used extensively. The vaccine was developed by Likhachev. Cattle bitten by rabid dogs are slaughtered immediately; other animals in the herd are vaccinated. Published reports on the incidence of rabies indicate that epizootics occur in domestic and wild animals.

Canine Distemper

The veterinarian in charge of the small-animal hospital we visited in Moscow reported that canine distemper exists in the Soviet Union. Vaccination against this disease is widely practiced with living and killed vaccines. Hyperimmune serum is administered for prevention of the disease in both exposed and young animals.

Sheep pox

This disease exists throughout the sheep-raising areas in the Southern Republics of the Soviet Union. Vaccine is widely used and is highly effective. The vaccine was developed by Academician M. Michochaev of GNKI in Moscow. Large quantities of vaccine are produced at the biocombine in Alma-Ata. Virus for vaccine production is produced by inoculation of virus subcutaneously in the umbilical region of sheep. Following a 4- to 5-day incubation period, the animal is killed and the edematous area around the site of inoculation is excised. As much as 300 to 400 milliliters of highly virulent fluid may be obtained from one sheep. This quantity is sufficient to produce 50 liters of vaccine, which will immunize 10,000 sheep. The vaccine is formalin- and heat-inactivated and aluminum hydroxide-adsorbed. It is administered subcutaneously in 5-milliliter doses and affords protection for 5 to 8 months. Sheep are vaccinated annually in areas where the disease has existed. In nonvaccinated fine-wool animals, mortality may be as high as

25 to 30 percent. In the summer months when animals are on pasture, the mortality rate is lower.

Fowl pox

This disease is enzootic in the Soviet Union. Vaccination is practiced in areas where the disease is known to exist. The vaccine most frequently used is produced on chicken embryos.

This virus is used at GNKI (Moscow) in a model system to study the structure and development of virus in cells, using electron microscopy techniques. These workers are of the opinion that the virus is contained in inclusion bodies produced in animals by this disease.

Diseases of Bacterial Origin

Bovine Tuberculosis

According to A. A. Boyko, Chairman of the Veterinary Collegium of the Ministry of Agriculture (Moscow), bovine tuberculosis in the Soviet Union has been rapidly reduced in recent years and now is nearing extinction. He hopes that it may be eradicated within the next 3 or 4 years. Clinical cases now are seldom seen. He reported on the incidence of bovine tuberculosis in several areas of the U.S.S.R. as follows: Russian Soviet Federated Socialist Republic, 0.2 percent; Azjerbaijan, 0.2 percent; White Russian S.S.R. (Belorussia), 1.17 percent; Uzbekistan, 0.2 percent; Turkmenia, none. I. F. Kvesitadze, of the Georgian Research Institute for Animal Husbandry and Veterinary Science (Tbilisi), said that the rate in Georgia is 0.2 percent. Boyko said that 25 million animals are tested annually. We do not know what proportion of the total cattle population this represents. At the Diagnostic Laboratory of the Bogoduhovsky District of the Ukraine we were told that all bovine animals in the Ukraine are tested annually, and that when infected herds are found, tests are repeated at shorter intervals until the disease has been eliminated. All reacting animals are slaughtered.

All tuberculin used in the Soviet Union is made at the biocombine in Kursk. The director, D. P. Drobyazgo, showed how it is prepared and explained how it is used in the field. A bovine strain of the tubercle bacillus is grown on a beef broth, which is glycerinated and supplemented with a potato extract. Cultures are incubated for 2 months in square bottles holding about 1 liter, the amount of culture medium being about half that amount. Since the bottles are incubated in a standing position, the area of fluid surface is much smaller in relation to the fluid volume than we maintain in our laboratories. The growth obtained was excellent, however. We saw cultures 2 weeks old in which the surface was covered with a fairly thick film of growth, and others 1 month old that had heavy surface blankets of growth.

At harvest time, the flasks are sterilized by steam heat and then the entire lot is poured together into evaporators and reduced to one-tenth the original volume. The concentrated fluid is filtered through several layers of gauze to remove the larger masses, then set aside to allow sedimentation to occur. Finally the clear supernatant fluid is filtered through Seitz filters. No preservative is added. The final product is placed in ampoules holding about 1 milliliter, flame-sealed, and then heat sterilized. Although the final product is bright and clear, it is much darker and more sirupy than our product.

The tuberculin-producing capacity of this plant is rather large, and its full facilities were in use. Drobyazgo said that intradermal and ophthalmic tests are used in Russia. In the former, the tuberculin is injected intradermally in the shaved skin of the side of the neck, the reaction being read about 72 hours later. In the latter, one dose of tuberculin is instilled into the eye when the intradermal injection is made, and another dose is given when the intradermal test is read. The ophthalmic reaction is judged about 8 hours after the second instillation.

Drobyazgo admitted that many NVL (No-Visible-Lesion) cases occurred in Russia. He had never heard about acid-fast skin lesions in cattle and did not think they occurred in his country. He thought that many NVL cases were animals that had microscopic lesions of tuberculosis, and that others were sensitized to tuberculin by Fasciola infections. He thought, also, that erysipelas vaccine might be the means of sensitizing swine to tuberculin.

Prof. M. V. Revo, at the Ukrainian Institute of Experimental Veterinary Science (Kharkov), is studying PPD (Purified Protein Derivative) and is doing some field testing with his products. He told us that he thought his product would be more specific than the currently-used tuberculin and would eventually replace it.

Mr. Boyko told us that owners and human caretakers have proved to be the source of herd infections in a few instances.

Brucellosis

In his orientation lecture on veterinary problems in the U.S.S.R., Mr. Boyko stated that bovine brucellosis has been eradicated from the Russian Republic and Baltic areas and now occurs only in negligible scattered outbreaks in other Republics. Two diagnostic tests, Wright's serum agglutination (tube) and complement-fixation, are recognized officially. The ring test is not used because it is not always accurate, and it becomes increasingly confusing in combination with mastitis cases. However, it is used extensively as an experimental procedure. The semen of bulls is not tested for brucellosis.

In herds with active infection, cattle are tested monthly and the reactors slaughtered. After the infection is eliminated, tests are run every 6 months until the disease is proved to be absent, after which annual tests are made. Strain 19 is used to vaccinate heifers at 6 to 8 months of age, and occasionally adult cattle are vaccinated instead of slaughtered.

In regions where cattle are run on ranges, strict control measures consist of vaccinating all heifers with strain 19. Likewise, in Republics where bovine brucellosis might exist, strain 19 is given to heifers as a prophylaxis. The vaccine contains 60 billion organisms per milliliter and is dessicated for storage and transportation. Killed organisms are being used experimentally to vaccinate heifers in limited areas.

Brucella suis occurs sporadically on a few farms in the heavily developed hog-breeding areas of the Ukraine but is negligible in other parts of the country. Only the Danish type of *Br. suis* occurs in the U.S.S.R.; the American type has not been recognized. For diagnostic purposes, serological tests are used early in the course of infection; however, as the disease progresses, an allergen made from a *suis* strain is used for intradermal injection into the ear.

Information indicated that *Brucella melitensis* is prevalent in sheep, and it spreads to cattle grazed with infected flocks. In 1930, the disease produced 25 percent of abortions, but has gradually lost virulence until 3 percent is considered severe. In some Republics 20 percent of the hares are found to be carriers of *Br. melitensis*.

The complement-fixation and agglutination tests are effective for early diagnosis of *Brucella melitensis* of sheep. However, an allergen made from a *Br. suis* strain that reacts later in the course of the disease is preferable because of its availability and ease of application. Injections are made in the caudal fold. The allergen is of little value in testing cattle but gives good results in testing hogs for *Br. suis* infection.

In the eradication program in some areas, if one sheep is found infected the whole flock is slaughtered. Since 1955, strain 19 has been used as a prophylaxis against *Brucella melitensis* infection of sheep. Under field trials with large numbers of ewes, 4.1 percent of infection occurred in unvaccinated flocks as compared with 1.4 percent in vaccinated flocks. After the third year of vaccination, there were no infected lambs; and animals reacting to the allergic test were reduced from 3.8 percent the first year to 0.04 percent the fourth year. Many vaccines are under experimental investigation in an effort to improve prophylactic measures. The percentage of abortions decreased and the lambs were healthier and stronger at birth in all flocks where effective vaccines were used.

In experimental work on vaccines, we were informed that animals failed to develop immunity if they did not react to the serological tests. The biochemistry of blood, fractions of alpha and beta globulins, complement-fixation tests, and allergic reactions are being studied to develop a practical method of determining the presence of immunity.

For this work, groups of 600 or more ewes are vaccinated. Suspensions of virulent organisms are used to challenge their resistance to the disease. The size of the challenge dose is determined by titration in unvaccinated pregnant ewes. Doses that produce 50 to 70 percent of abortions are used. At intervals, 25 to 30 pregnant ewes are taken from each vaccinated group and challenged with the above dose of virulent organisms.

Vibriosis of Cattle and Sheep

A conflicting opinion exists concerning the presence of *Vibrio fetus* in the U.S.S.R. It was unknown prior to 1953, when it was apparently imported with British cattle. About that time, it was also imported from the United States in Santa Gertrudis bulls. These outbreaks were diagnosed by cultural

isolation, tampon, and complement-fixation testing of bull serum.

Bulls are treated either by parenteral injections of streptomycin and biomycin in combination with a local application of iodine or by a local application of iodine simultaneously with inflation of the prepuce with air. Cows showing symptoms are also treated. As a prophylaxis, 800,000 units of penicillin and 800,000 micrograms of streptomycin are added to each cubic centimeter of diluted semen used for artificial insemination.

People familiar with the vibriosis problem stated that it exists in cattle in western U.S.S.R., and that two cases of V. fetus in sheep have been reported in southern Russia.

Paratuberculosis of Cattle

This disease exists in the Soviet Union, but we did not learn about its prevalence. In Academician S. N. Muromtsev's laboratory at VIEV (Moscow), one of the workers studying fluorescent microscopy was enthusiastic about its value for diagnosing Johne's disease. In answer to questions, he said that the complement-fixation test was a good test for confirming the presence of this disease, and that avian tuberculin is considered a reliable field test. Johnin apparently is not made or used.

Glanders

Mr. Boyko told us that glanders had formerly been very common in the Soviet Union, but use of the mallein test followed by slaughter of all reactors had "almost" eliminated the disease. I. N. Gladenko, Director of the Ukrainian Institute of Experimental Veterinary Science (Kharkov), confirmed Boyko's statement but said that in the Ukraine elimination is complete. In earlier years a good deal of work on this disease was done at this institute. Serologic and allergic tests were studied, and for a time mallein was made for the entire Soviet Union. A. Ya. Dzerzhinskiy, Director of the Kazakh Veterinary Research Institute (Alma-Ata), confirmed the previous statements about this disease and added that the Kazakh Republic now is thought to be free from glanders. Mallein was being made on a small scale at the biocombine in Kursk, which indicates that some testing is still being done for this disease in Russia. Considerable supplies of mallein are exported to China.

Anthrax

Boyko in Moscow and Dzerzhinskiy in Alma-Ata agreed in their statements on anthrax. Both stated that the disease formerly was prevalent in many parts of Russia but now seldom occurs, largely because of systematic vaccination of cattle and sheep in areas known to be infected. The vaccine most commonly used is the STI vaccine, developed by a worker named Ginsberg. This is a spore vaccine declared by the Russians to be superior to the Sterne and other vaccines used in western countries. We did not learn the details of its manufacture.

Swine Erysipelas

Boyko reported that swine erysipelas is a disease of some importance in the Soviet Union. On all large farms the herds of swine usually are prophylactically vaccinated shortly after weaning, and often are again treated before thay are 1 year of age if they are to be kept for breeding purposes. Both living and dead vaccines are used. The live vaccine is that of Kotov; the killed type usually is that prepared by the method of Glukhovtsev. There is also a killed vaccine suspended in an aluminum hydroxide adjuvant as developed by Merkulov and Epstein. S. D. Morozov, Director of the Kirgizian Republic Veterinary Laboratory (Frunze), told us that only chemically inactivated erysipelas vaccine is used in his State. He said that the only erysipelas encountered was in animals that had been missed in vaccinating.

Salmonella Infections

At the veterinary diagnostic laboratory of the Bogodukhovsky District in the Ukraine, cultures of Lactobacillus acidophilus in a meat infusion broth were being prepared for treating calves suffering from what was called paratyphoid infection. On several of the large state farms where very large herds of cattle are kept and many calves are being raised, the local personnel told us that they experienced little trouble with diarrhea or scours. At one of these places we saw a severely scouring calf. Later we learned that one of the products made at the Alma-Ata biocombine was a colibacillosis antiserum. We conclude that Russian calves probably suffer from diarrhea just as ours do.

Gladenko (Kharkov) admitted that Salmonella infections are frequent in ducks and

geese. He also claimed that pullorum infection of chickens could now be considered as under good control, since epizootics no longer occur. Sporadic outbreaks are seen occasionally. The agglutination test is used to find infected breeding stock, and by destroying this stock, the disease is gradually being eliminated. Kvesitadze (Tbilisi) said that pullorum disease is a problem in Georgia. Outbreaks are treated by placing pullorum phages in the drinking water. Sometimes antibiotics are used. He had never heard of lung and air-sac infections in incubator-hatched chicks, although they use mechanical incubators.

Contagious Agalactiae of Sheep and Goats

This disease appears to be more or less prevalent in several of the Southern Republics. We heard of it in Georgia, Kirgizia, and Kazakhstan. Kvesitadze (Tbilisi) claimed that this disease is not the same as the one of the same name in the Mediterranean regions of Europe, which is thought to be caused by a pleuropneumonia-like organism. The Georgian disease, he claimed, is due to a small coccus, which appears in clumps like staphylococci. We were shown cultures growing on agar slants. The colonies were fine, translucent ones not unlike PPLO strains. Microscopically, the organisms appeared like small micrococci.

This disease is highly contagious and is passed from ewe to ewe on the hands of milkers (this is a sheep cheese region). The disease is manifested by mild symptoms of mastitis and rapid diminution of milk secretion. Joint infections are frequent, the victims being very lame as a result. Conjunctivitis is common, and sometimes pericarditis and pleuritis.

We were not convinced that the disease is different from that occurring in southern Europe. One member of our party, a pathologist (Dr. Jensen), requested pieces of formalin-fixed or paraffin-embedded tissue at all laboratories in which this disease was mentioned, but his quest was in vain. None of them seemed to have any specimens.

Contagious Bovine Pleuropneumonia

Mr. Boyko told us in Moscow that this disease had formerly been common in the U.S.S.R. but now has been almost eradicated. Dzerzhinskiy (Alma-Ata) said that it has been completely stamped out. Presumably the latter was referring only to the Kazakh Republic.

Tularemia

We did not inquire about the incidence of tularemia in the U.S.S.R. It is well known that this disease has been a problem in the past, because of the large epidemics reported among people. The fact that a laboratory is maintained at VIEV for the study of tularemia indicates that it has some importance.

Anaerobic Infections

Blackleg prevails over much of Russia but is well controlled by vaccination, according to Prof. V. N. Syurin, Director of GNKI in Moscow. The disease is seen only rarely in sheep, and this species is not ordinarily vaccinated. On cattle a single vaccine has been used for many years and is one of their most satisfactory vaccines; it gives very good protection and very little trouble in either manufacture or use. Much, if not all, of this vaccine is made at the biocombine at Alma-Ata, where it is prepared in large stainless-steel tanks. The medium, a hydrolysate fortified with liver extract, is fluid; the final product is formalinized. Prof. Syurin and some of the field staff in the Ukraine agreed that the vaccine gave nearly perfect results in the field and said that blackleg is unknown except in occasional animals that escape vaccination for some reason.

Bradsot in sheep, or malignant edema infections, occurs in the steppe regions of Kazakhstan and other southeastern Republics, according to Syurin (Moscow). Our inquiries about enterotoxemia in sheep brought forth little information. Some did not seem to understand what disease was meant; others, like Gladenko (Kharkov), said categorically that the disease does not occur in their country. However, lamb dysentery vaccine and L.D. antiserum are manufactured at the Alma-Ata biocombine.

Listeriosis

Listeria infections either are uncommon in the Soviet Union or are generally unrecognized. Several groups in different areas told us that they had not seen this disease. The only person we encountered who was working on it was Prof. I. P. Lysenko, of the Ukrainian Institute of Experimental Veterinary Science (Kharkov). Lysenko said that the disease occurs in both sheep and cattle in the Soviet Union but is uncommon. He questioned claims that the

organism is pathogenic for man, and he had not been able to confirm claims that the organisms occur frequently in swine as latent infections. He claimed he was able to protect mice with several injections of killed culture, but he had not tried the process on larger animals. He also said that he could diagnose the infection in animals with an agglutination test, using a strain that is not spontaneously agglutinable.

Necrobacillosis

We obtained little information about the damaging effects of this condition in livestock. Director V. F. Gusev, Veterinary Research Institute (Leningrad), said that this organism causes much trouble in his region, especially in sheep and reindeer; not so much in cattle. Gladenko (Kharkov) said that foot rot in cattle is seen occasionally but is not a serious problem. Kvesitadze (Tbilisi) said that the contagious form of foot rot of sheep is unknown in Georgia.

Bovine Mastitis

A number of people in several veterinary centers told us that bovine mastitis is not a serious problem in Russian dairy cattle. The only veterinarian who admitted the existence of streptococcic mastitis was Gusev, in Leningrad. Gusev also said that it is not a highly prevalent disease but that it causes considerable trouble on some farms. For treatment, antibiotics mixed with novocaine are generally injected into the connective tissue of the gland; sometimes the drugs are injected through the teat canal into the milk cistern. Furacin compounds are also used with success.

Biologics Used to Combat Bacterial Infections of Animals

We visited two of the many biologic manufacturing plants of the U.S.S.R.--the biocombines at Kursk and at Alma-Ata. The following products used to combat bacterial diseases were being made in one or both of these factories: Tuberculin, mallein, Strain 19 vaccine (brucellosis), blackleg vaccine, bradsot vaccine, lamb dysentery vaccine, anthrax (STI) vaccine, and swine erysipelas vaccine. The following antibacterial serums were being made: Swine erysipelas serum, paratyphoid serum (for lambs), lamb dysentery serum, hemorrhagic septicemia serum, and colibacillosis serum (for calves). We did not inquire about tetanus toxoid and tetanus antitoxin, but it can hardly be doubted that both are made and used.

Miscellaneous Work in Bacteriology

The Kirgizian Republic Veterinary Laboratory (Frunze) was manufacturing and distributing a Salmonella muriseptica culture for contaminating bait used to destroy rats and mice. At the Ukrainian Institute of Experimental Veterinary Science (Kharkov), Professor Gladenko was working on antibiotic residues in milk and body tissues and their possible effect on human health. In VIEV (Moscow), Academician S. N. Muromtsev was carrying on various studies on the cytology of bacteria with the aid of the electron microscope, cinemicrophotography, and fluorescent antibody techniques. He was producing antigenic changes in certain bacteria by cultivating them in the presence of nucleoproteins of other species. He was also following the process of immunogenesis by labeling bacterial antigens with tracer (radioactive) elements.

Parasites and Parasitic Diseases

For the most part, the parasites and parasitic diseases of livestock and poultry in the Soviet Union are similar to those in the United States. Many species of helminths, protozoa, and arthropods are common to both countries; but, as one would expect, a number of species found in one country are not found in the other. The extent to which the latter obtains cannot be fully determined, however, until and unless a greater exchange of information is established among specialists in the taxonomy and systematics of parasites.

An augmented interchange of information in all other phases of parasitology is also needed, despite the fact that parasitologists of both countries are unquestionably better informed on the achievements of their foreign colleagues than are workers in any other discipline of veterinary medicine. Our Russian counterparts, however, are undoubtedly far better informed on developments in the United States than are American workers on findings and accomplishments in the Soviet Union. This is probably ascribable, at least in part, to (1) a reading knowledge of English by many Russian scientists whereas relatively few Americans have a comparable command of the Russian language; (2) the availability in

Russian educational and research institutions of most American veterinary and other parasitological literature as compared with the dearth of Russian material in most American institutions; (3) the wide use by American workers of biweekly, monthly, and quarterly periodicals for publishing their findings as contrasted with the Russian system of primary reliance on annual or other institutional reports and on proceedings of symposia and special conferences; and (4) a highly developed abstracting service by the Institute of Scientific Information, U.S.S.R. Academy of Sciences, Moscow. In the quest for information of this kind, therefore, the advantage obviously lies with the Russians; and they are wisely taking full advantage of it.

On the basis of our short, hasty, and essentially guided tour of the Soviet Union, any broad generalizations on the status of veterinary parasitology in Russia and extensive comparisons between our two countries would be hazardous and manifestly unwise. Nevertheless, we gained certain impressions and drew certain inferences in consequence of the institutions we visited, the equipment and facilities observed, the persons interviewed, and the information disclosed in prepared talks and in general discussions.

Veterinary parasitology in the U.S.S.R. seemed to compare more favorably with that in the United States than was evident with any of the other veterinary sciences on which we obtained information. Their forte is definitely taxonomy and systematics, as exemplified by the classical works of the renowned Skryabin and his many students and followers. This is perhaps inevitable in view of the minimal requirements for laboratory facilities, equipment, and expendable animals in this phase of parasitology. We saw excellent parasite collections, attractively displayed, in some of the research institutions. Particularly impressive were the collections at (1) the All-Union Skryabin Institute of Helminthology in Moscow, (2) the Kazakh Veterinary Research Institute in Alma-Ata, and (3) the Department of Parasitology, Institute of Zoology, Kazakh Academy of Sciences (Alma-Ata).

A major deficiency in parasitology, as well as in other veterinary sciences, was the apparent lack of facilities for experimental animals--at least within reasonable proximity to the various institutions. We did not observe experimental investigations involving livestock and poultry, notably pathogenicity studies and antiparasitic trials, at any of the institutions we visited. Repeated requests to see experimental animals and facilities invariably invoked the same response, namely, that these were some 30 or 40 kilometers from the institution and time did not permit visitation. This suggests that many biological investigations, chemotherapeutic trials, and other experimental control measures are probably pursued largely on the collective and state farms when specific problems arise; over 500 workers were reported to be engaged in researches on the control of helminthic diseases alone.

Insofar as the chemical control of parasitic infections is concerned, the preparations in common use seemed to be largely those developed outside the Soviet Union. Nevertheless, experimental investigations of this kind were said to be underway in several of the institutions we visited, although we were not afforded an opportunity to observe any of the work in progress. Much of this experimentation apparently involves the adaptation of known antiparasitic agents and measures to the specific conditions found in the Soviet Union. The usefulness of this tack is indicated by the results reportedly obtained in some of the parasite control programs (vide infra). Their ultimate aim, as related by several individuals, is the complete eradication of these pests--a very laudable objective shared by veterinary parasitologists in all areas of the globe.

The diseases that seemed to be of concern in the Soviet Union differed somewhat in the various geographical areas, depending, to some extent, on the kind of livestock that predominated. Among the parasitoses that were said to be of primary importance were echinococcosis, coenurosis, monieziosis, fascioliasis, dictyocauliasis, ascariasis, hypodermatosis, demodecosis, piroplasmosis, trichomoniasis, and anaplasmosis. Preventive measures, including medication as well as pasture rotation and other management practices, are widely used; and therapeutic dosing is carried out on a very large scale. Officials in the Ministry of Agriculture recognize that chemical control measures are sometimes expensive, but it is their considered opinion that the expense is usually justified.

A summary of the information obtained on parasites and parasitic diseases in the Soviet Union is given in the paragraphs that follow. Circumstances seldom permitted detailed discussions; and inquiries pertaining to techniques and to other spe-

cifics usually prompted offers of reprints, annual reports, and other institutional publications. These we eagerly accepted and, indeed, frequently solicited on an exchange basis.

Protozoa

Anaplasma

In recent years anaplasmosis has increased in cattle (Anaplasma marginale), sheep (A. ovis), and goats. It was specifically mentioned among the parasitic diseases occurring in sheep in the southern part of the Kazakh Republic. Chemotherapy investigations are underway, but none of the available compounds are very effective.

Babesia

Piroplasmosis is an important disease in horses (Babesia caballi; B. equi), cattle (B. bovis; B. bigeminum), sheep (B. ovis), goats, and swine. In cattle, it is treated with Acriflavine, Acaprin, and a Russian preparation, Piroplasmin (I. L. Matikashvili).

Treatment investigations and transmission studies, especially with ticks such as the castor bean tick, Ixodes ricinus, are in progress at the Leningrad Scientific Research Veterinary Institute. Two types of compounds are of particular interest, namely, urea derivatives and silver-sulfur complexes. Haemosporidin, a urea derivative, has the same general effect as Acaprin but without the side effects associated with the latter. A 1-percent aqueous solution of the chemical is given subcutaneously to cattle at the rate of 1 milligram per kilogram of body weight. Thiargen, a preparation of silver and sulfur, must be given intravenously. The Russian veterinarians prefer the urea compound because it is easier to administer. Both compounds are very effective, especially when given with antibiotics or "biological stimulators." (Gusev). Piroplasmosis has been eliminated from the Ukraine. (Kolomiyets).

Coccidia

Coccidiosis, particularly Eimeria tenella infections, occurs among chickens and is controlled with sulfonamides. Experimental work is underway with certain nitrofuran compounds, but the results have not been analyzed. There has not been an opportunity to use Nicarbazin. (Orlov).

Coccidiosis is not important in sheep or dairy calves. (Gusev).

Histomonas

Enterohepatitis, or blackhead (Histomonas meleagridis infection), is not known to occur in the Soviet Union, where there are very few turkeys. (Orlov).

Theileria

Theileriosis (Theileria annulata) is most important in cattle, but it is also found occasionally in sheep and goats (Th. ovis). (Markov). In cattle, it is treated with Aminoacriquine, a chemical related to Atabrine. A 1-percent aqueous solution is given intravenously 3 times a week at the rate of 1 gram per 300 kilograms of body weight. (I. L. Matikashvili).

Trichomonas

Bovine venereal trichomoniasis (Trichomonas foetus) is an economically important disease in the U.S.S.R. and is receiving its full share of attention in various research institutions.

The incidence of trichomoniasis is being reduced, and the disease was reported to be completely eradicated from some regions. A total of 1,300 diagnostic laboratories are equipped to make serological examinations, cultural isolation, or microscopical identification of the protozoan.

A medium for cultural isolation contains sodium chloride, sodium citrate, glucose, antibiotics (streptomycin and penicillin), distilled water, and 1 to 10 parts of milk. The milk serves as a buffer and must be fresh and unsterilized.

Treatment has not been very effective, and Russian workers hoped that if we had a good technique we would share it. Their method has been to irrigate the preputial cavity with a mixture of iodine, chloroform, and vaseline simultaneously with inflation by air. Recently infected bulls are given 3 treatments of 50-cc. doses each. Animals having chronic infection are given similar treatments for an extended period. Treatment has no value in generalized cases. After treatment, bulls are examined by culture 3 times at 7- to 10-day intervals and monthly thereafter if the bull is used for artificial insemination.

In poultry, trichomoniasis is not considered to be an economically important disease at present.

Trypanosoma

Three kinds of trypanosomiasis, namely, dourine (Trypanosoma equiperdum), surra

(T. evansi), and a surra-like disease (T. ninae-kohl-yakimovi) have been economically important protozoan diseases in the U.S.S.R. The organism producing the surra-like disease is morphologically identical with T. evansi, but it is less pathogenic. The condition was found primarily in camels, although horses, asses, and hybrids were also affected. Neither of the surra-type diseases occurs at present; both were eliminated before World War II by use of improved diagnostic tests, medication, and slaughter of all animals that continued to show positive tests despite repeated treatment. The drugs used were Naganol (also known as Suramin, Germanin, and Bayer 205) and a Russian analogue, Naganene. The latter was useful prophylactically as well as therapeutically; it protected the animals from infection with the organism for a month or two after medication. The disease reappeared during World War II, but animals were successfully treated with Antrycide.

The disease in camels was found most frequently along the Ural River; and during massive flights of horse flies (presumably, Tabanus spp.) the camels were moved to the East where there are no rivers and only salt lakes. The flies could not live in this area, and the camels were able to overcome the infection.

T. evansi from camels is being studied experimentally in reindeer at the Experimental Farm of the Institute of Zoology, Kazakh Academy of Sciences.

An allergic test was developed in the Protozoology Laboratory of the Ukrainian Institute of Experimental Veterinary Science to aid in the diagnosis of trypanosomiasis of horses that appeared after World War II.

Arthropods

Demodex

Demodectic mange (Demodex folliculorum) occurs widely in dogs and is fairly common in cattle; it is seldom seen in horses and swine. The disease in cattle is under investigation in the Arachnology Laboratory of the All-Union Scientific Research Institute of Veterinary Sanitation and Ectoparasitology. Experimental infections are established by contact between clean and infected animals and by mechanical transfer of infective material to the skin of susceptible animals. In experimental infections, the lesions develop in 3 to 6 months and persist for as long as 5 years; few mites are demonstrable clinically but many are found at autopsy. (D.K. Polyakov). The organisms have not been found in the blood or other internal organs. (D. K. Polyakov; N. V. Matikashvili).

The treatment for demodectic mange in cattle is arsenic trioxide dip; in dogs a 14-percent colloidal iodine wash is recommended. Hexachloran was ineffective when given intravenously; other chlorinated hydrocarbon insecticides have not been used. (D. K. Polyakov).

A preparation made from Melia azedarach, a plant indigenous to India, has proved to be very effective for the treatment of demodectic mange in dogs. A 1:2 or 1:3 mixture of the material is applied to the affected areas, and clinical cure is said to be obtained in most instances after 3 to 5 treatments. We were given a summary of the procedure and a reference to a detailed discussion of the treatment, both in Russian. (N. V. Matikashvili).

Gasterophilus

Several species of stomach bots are encountered in horses in the Soviet Union. The one that occurs most frequently, Gasterophilus veterinus (nasalis), is also a common species in the United States. Three additional species, G. intestinalis, G. hemorrhoidalis, and G. inermis (the European horse bot), are also found in both countries although G. inermis occurs infrequently in the United States. One species, G. pecorum, differs from other members of the genus in that the fly deposits its eggs on vegetation rather than on the animal; this species does not occur in American horses.

Carbon tetrachloride and carbon disulfide are the chemicals most widely used for removal of stomach bots from horses in the U.S.S.R.

Hypoderma

Hypodermatosis (Hypoderma bovis) is commonly found throughout the Soviet Union although it was reported to be controlled by the use of Hexachloran (BHC) sprays in the summer and systemic organic phosphorus compounds in the fall. (Andreyev). In a limited discussion of this condition, Andreyev deprecated the policy of voluntary control measures in the United States. Moreover, we were apprised, in words and tone approaching vehemence, that Americans cannot hope to control flies because spraying is not obligatory. The humor of the situation was not evident at the time;

but it was with no small measure of satisfaction that we noted many flies on several occasions during the remainder of our tour of the Soviet Union, obligatory spraying to the contrary notwithstanding!

Miscellaneous flies

Bayer 13/59 (Dipterex) is sometimes used on dairy calves; and 5 percent DDT in oil was said to be used occasionally on adult cattle, although organic phosphorus compounds are better. (Andreyev).

The veterinarian at the state farm dairy in the Republic of Georgia stated that DDT in kerosene is used as a residual spray on the floors of the barn but that nothing is used directly on the milking animals. There was little evidence of fly control in this establishment.

Oestrus

The nose bot (_Oestrus ovis_) of sheep is commonly found in the U.S.S.R. Two treatments that are widely used for its control are 0.5 percent Hexachloran and 3 percent creolin; both are given intranasally under moderate pressure. Experimental trials with organic phosphorus compounds are underway but their efficiency has not been determined.

Psorergates

The so-called itch mite (_Psorergates ovis_) is not known to occur in the Soviet Union. Inquiries concerning its presence invariably caused considerable bewilderment because of the similarity in spelling with that of the common sheep scab mite. In this connection, one individual (Andreyev) reprimanded American parasitologists for flouting the international rules of nomenclature! He could not have given a more definitive answer to the inquiry.

Psoroptes

Common scab (_Psoroptes equi_ var. _ovis_) was said to have been completely eliminated from sheep in the Kirgiz Republic. This was accomplished with the chlorinated hydrocarbon insecticides, primarily benzene hexachloride. (Umaraliyev). Officials of the Ministry of Agriculture stated that mange of livestock, presumably with the exception of the demodectic variety, has been almost completely eliminated from Russia.

Rhinoestrus

At least two species of this fly, _Rhinoestrus latifrons_ and _R. purpureus_, attack horses in the U.S.S.R. The eggs are deposited in the nasal cavity, and the resultant infestation may be fatal. Treatment consists in spraying the nasal cavity with "S-20," a preparation comprised of lindane and mineral oil. Some control is achieved by pasturing the horses only at night during the fly season.

Helminths

Trematodes

Dicrocoelium.--The lancet fluke, _Dicrocoelium dendriticum_, occurs in many parts of the Soviet Union and, as in the United States, there is no effective treatment for its removal. Preventive measures are directed toward the destruction or control of the snail intermediate host. This is accomplished by plowing the fields, which is said to result in the disappearance of most of the snails, and by using ducks and geese as a biological control measure. It was reported that about 90 percent of the snails are destroyed by the birds within 5 days.

Following the recent demonstration that ants serve as a second intermediate host for the lancet fluke, attempts have been made to control the parasite by destruction of these insects with "Nikochoral," a Russian product of undetermined composition. The results of these trials have not been analyzed.

Fasciola.--The common liver fluke, _Fasciola hepatica_, is a very important parasite of ruminants and, to a somewhat lesser degree, of swine. The treatment of choice in sheep and swine is carbon tetrachloride administered subcutaneously; in cattle, hexachloroethane is the preferred drug. Recent experimental trials suggest that Freon 112 ($C_2Cl_4F_2$) is an effective alternative treatment.

Paramphistomum.--The rumen flukes, _Paramphistomum_ spp., are fairly prevalent in cattle and are reasonably well controlled with hexachloroethane.

Prosthogonimus.--Several species of _Prosthogonimus_ occur in the oviduct and Bursa of Fabricius of poultry in the Soviet Union, but we did not ascertain their economic importance.

Miscellaneous.--Academician Skryabin and his associates have completed volume 14 of the trematode series, and it was expected

that this treatise would be published during the latter part of 1958. The series will total 20 volumes, the last of which will be a summary of all preceding volumes.

Nematodes

Ancylostoma.--The hookworm, Ancylostoma caninum, is a common parasite of dogs in Russia. Toluene, carbon tetrachloride, and tetrachloroethylene were mentioned as agents used for its removal. Intrauterine transmission is not known to occur; but the phenomenon is well known insofar as the large roundworm, Toxocara canis, is concerned.

Ascaris and others.--The large roundworm, Ascaris lumbricoides, is the most important helminth of swine in the U.S.S.R. Control measures employed against this parasite vary from one area to another, but sodium silicofluoride seemed to be the chemical most widely used for group treatments. Two methods of employing the drug were described. In one method, the chemical is given in the feed, once daily for 3 days, at the rate of 0.01 gram per kilogram of body weight. The treatment is given three times per year. In the other method, the appropriate dose is divided into morning and afternoon feedings and repeated in 2 days. The animals are treated periodically from 2 months of age until they reach market weight. Sodium silicofluoride was reported to be less toxic than the fluoride salt which was said to produce anemia. The sodium fluoride treatment is still used in some areas; but piperazine and cadmium have apparently been employed only on an experimental basis, if at all. The drug of choice for the treatment of individual animals is santonin.

Toluene, carbon tetrachloride, carbon disulfide, and sodium fluoride are all used to some extent for the removal of the large roundworm, Parascaris equorum, from horses.

Sodium sulfate is the treatment of choice for the removal of Neoascaris vitulorum from calves. The chemical was said to be as effective as piperazine and is, of course, much less expensive.

Carbon tetrachloride is used against Ascaridia galli infections in chickens. The birds are fasted overnight; and shortly before treatment they are given 5 to 10 grams of corn. The chemical is injected into the crop in liquid form. Piperazine was said to be used in the drinking water for the removal of Ascaridia, but it is probably employed only on a very limited scale.

Chabertia.--The large-mouthed bowel worm, Chabertia ovina, is found in Kazakhstan, and perhaps elsewhere, but it is not an economically important species. It is controlled, when necessary, with phenothiazine.

Cooperia.--These small intestinal nematodes, Cooperia spp., of ruminants occur infrequently in the Alma-Ata (Kazakhstan) area; and they apparently are not found around Frunze (Kirgizia). We did not obtain information on their occurrence in other parts of the Soviet Union.

Dictyocaulus.--The thread lungworm, Dictyocaulus filaria in sheep and D. viviparus in cattle, is one of the major helminthic infections of ruminants in the Soviet Union. Intratracheal injections of Lugol's Solution seems to be the most common treatment in the field, but investigators at the Leningrad Scientific Research Veterinary Institute have developed an apparatus for administering iodine vapors by inhalation which they believe is safer and more effective than the intratracheal injections. Moreover, in recent experimental trials, diethylcarbamazine (Ditrazin) has shown considerable promise against Dictyocaulus and Muellerius infections in sheep and goats, but the chemical is too expensive for general use.

The most interesting information on the control of dictyocauliasis in sheep was provided by Shul'ts in the Kazakh Republic and Kopienko in the Kirgiz Republic. Both workers reported that after maintaining sheep on a low-level phenothiazine regimen for 3 or 4 years they no longer had a Dictyocaulus problem. They believe they have virtually eradicated Dictyocaulus, as well as Haemonchus, with the regimen. The result is attributed to an impairment of the reproductive capacity of the worms. A 10-percent increase in body weight, wool production, and weight of newborn lambs is also ascribed to this parasite control measure.

The regimen is somewhat different from that employed in the United States. During the winter months, the animals are given access to a 1:9 phenothiazine-salt mixture; but during the summer grazing period, the ratio is changed to 1:14. The mixtures are given for 20 days and withheld for 10 days, a procedure similar to that employed for the control of equine strongylosis in the United States. The average daily consumption of phenothiazine is said to be about 1.2 grams in both summer and winter. Although no clinical symptoms are exhibited, liver damage is said to occur when animals are maintained continuously on low-level mixtures.

In addition to D. filaria, several other species of lungworms occur in sheep in the Kazakh Republic, particularly in the mountain pastures. Some of those named were D. schultzi, Protostrongylus hobmaieri, P. rufescens, P. skriabini, and P. raillieti. Muellerius capillaris is found in the Caucasus area and in Central Asia and Siberia but not around Alma-Ata.

Elaeophora.--The arterial worm, Elaeophora schneideri, of sheep is not known to occur in the Soviet Union.

Haemonchus.--The common stomach worm, Haemonchus contortus, of ruminants occurs in all areas of the Soviet Union. It is satisfactorily controlled, however, with the usual remedies; and in two of the Southern Republics, Kazakhstan and Kirgizia, the parasite was reported to have been virtually eradicated by a low-level phenothiazine-salt program.

Heterakis.--The cecal worm, Heterakis gallinae, of chickens is a common parasite in the Soviet Union; but it seldom occurs in significant numbers. Its importance is further minimized by the absence of a blackhead problem; there are very few turkeys in Russia.

Oesophagostomum.--The nodular worms, Oesophagostomum spp., of ruminants are fairly prevalent in the U.S.S.R., but they are readily controlled with phenothiazine. At one research institution where specific inquiry was made, these parasites were said to be of no importance in swine because of the virtually constant movements of animals on pasture. There are no fences; rather, the animals are herded like flocks of sheep, as in the mountainous pastures of the western United States. The sows and litters are under constant surveillance by herders, usually women, from farrowing to weaning.

Strongylus.--Large and small strongyles, Strongylus spp., and the many species of cylicostomes, occur throughout all parts of the Soviet Union. For the most part, they are controlled with phenothiazine; sodium silicofluoride, given in feed at the rate of 0.005 gram per kilogram of body weight, is used in the Kirgiz Republic (Kopienko). Piperazine has been used only experimentally; it is too expensive for general use.

Thelazia.--The biological cycle of the eyeworm, Thelazia rhodesi, of cattle was determined by Klesov at the Ukrainian Institute of Experimental Veterinary Science in Kharkov. This parasite has been known in the U.S.S.R. since 1946. The adult worms occur in the conjunctival sac and in the lachrymal ducts. Eggs of the worm are ingested by the fly, Musca larvipara; and, after hatching, the first stage larvae pass to the ovaries where they develop to the infective stage in 18 to 20 days. The infective larvae then pass to the proboscis and are transferred to a susceptible host when the fly feeds on the eye secretions. The worms reach the adult stage in 25 to 27 days. In the Far East, Krastin determined that M. convexifrons serves as the intermediate host.

Control is achieved by treating the cattle during the winter months when the adult flies are dead and the only reservoir for the parasites is the eye of infected cattle. Treatment consists in flushing the conjunctival sac with a 1:2,000 aqueous solution of iodine and potassium iodide. One treatment is sufficient, but the eye must be flushed three times. About 30 or 40 head may be treated in an hour.

Cestodes

In dogs.--Many tapeworm species are found in dogs. Among those specifically mentioned were Echinococcus granulosus, Multiceps multiceps, Taenia ovis, T. hydatigena, T. pisiformis, and Dipylidium caninum. Dikov (Alma-Ata) has done a great deal of work on canine teniacides. He believes that proper preparation of the animal is the determinant factor in the success or failure of treatment. The procedure recommended consists in withholding all feed for 24 hours and giving an injection of Lentin 2 hours before the usual dose of arecoline hydrobromide; the latter is used almost exclusively for the treatment of tapeworm infections of dogs.

In horses.--Anaplocephala spp. are found in horses, but they are not regarded to be of any clinical importance; no treatment is recommended.

In poultry.--A number of different tapeworms are encountered in poultry, but they do not appear to be of major concern. Nevertheless, tin arsenate, 0.2 gram per bird, was reported to be effective against Raillietina, Davainea, Hymenolepis, and others (Chubabriya). Workers at VIGIS in Moscow reported that Kamala is effective against poultry tapeworms.

In ruminants.--Larval and adult cestodes are among the most important parasitic conditions affecting ruminants, especially sheep, in the Soviet Union. Adult tapeworms that were said to occur in sheep are Moniezia expansa, M. benedeni, Thysaniesia ovilla (correct name, Th. giardi), and

Avitellina centripunctata; the first two species are also found in cattle. The seasonal incidence of the several species follows a fairly definite pattern. M. expansa is first to appear during the spring of the first year, M. benedeni does not appear until fall; and Avitellina does not reach maximum levels until the third year. No information was obtained on Thysaniesia in this regard, although it was indicated that this species is more common than Moniezia in the Kazakh Republic. The fringed tapeworm, Thysanosoma actinioides, does not occur in the Soviet Union. Parenthetically, Shul'ts does not believe that oribatid mites serve as intermediate hosts for anaplocephaline tapeworms other than Moniezia.

Neither Thysaniesia nor Avitellina are regarded as pathogenic species, but Moniezia infections in young lambs are said to result in 10 to 15 percent lower weight at weaning. The Soviet investigators are cognizant of reports by American and other workers which indicate that Moniezia is relatively innocuous in experimentally infected lambs. They noted, however, that in these instances the infections were generally established in lambs after weaning, that the animals were well housed and well fed, and that the lambs were not subjected to any of the conditions of stress that usually obtain in the field.

Copper sulfate is not effective against Thysaniesia, but it is the treatment of choice against Moniezia in the Ukraine (Rakovskiy). Lead arsenate, 0.4 gram for lambs, is the preferred treatment in the Kirgiz Republic (Kopienko); and tin arsenate, a treatment recently developed in Russia, is the favored drug in the Georgian and Kazakh Republics. (Chubabriya; Shul'ts). The recommended dose--0.5 gram for lambs and 1.0 gram for adults--is effective and very safe. "Filixan," a new powder extract of Filix mas (male fern), was reported to be effective against Moniezia in experimental trials.

The larval stages of Multiceps multiceps ("gid" parasite; coenurosis), Echinococcus granulosus (hydatid), Taenia ovis ("measles"), and T. hydatigena (thin-necked bladder worm; Cysticercus tenuicollis) are commonly encountered in all principal sheep-raising areas. Coenurosis has been a very serious problem, particularly in the Kazakh Republic; a major campaign is underway to eradicate the disease from all Republics of the U.S.S.R. by periodic treatment of dogs and effective disposal of infective material.

Antiparasitic Investigations

All our requests to observe the facilities available for antiparasitic investigations, especially anthelmintic testing, were unheeded. Presumably, much of the testing of protozoacides, insecticides, acaricides, etc., is done on the state and collective farms after minimal preliminary trials in the laboratory. This is a reasonably suitable arrangement since (1) several of the pathogenic protozoa can be established experimentally in small laboratory animals; (2) the latter may harbor related species that respond similarly to chemical agents; and (3) it is common practice to conduct preliminary in vitro tests with potential insecticides, acaricides, and related chemicals.

Equally satisfactory experimental host-parasite systems have not been established for most of the important helminth parasites of domestic animals, and in vitro trials are essentially worthless insofar as demonstrating potentially useful anthelmintics is concerned. We know from reports in the literature that some definitive anthelminthic testing is done in the U.S.S.R.; and we regret that we were not afforded an opportunity to observe the facilities and procedures firsthand. Nevertheless, we discussed some of the techniques briefly with Shul'ts and Chubabriya at Alma-Ata and Tbilisi, respectively.

Shul'ts noted that the "controlled test" is usually employed for assaying the efficacy of most anthelmintics in sheep. This method, using large numbers of animals, is considered best for parasites such as Haemonchus, because of the destruction of large numbers of worms during their passage through the intestinal tract. The controlled test is well suited for obtaining confirmatory data on the farms; but it is not feasible for the initial testing of potentially useful chemicals.

The critical test is used occasionally. In this instance, Chabertia, Oesophagostomum, and other relatively stout worms are counted directly; and aliquots are examined for the smaller trichostrongyles. The critical test is also used in teniacidal and nematocidal trials with dogs. In the former, the feces are screened to recover all scolices (except that aliquots are examined in the case of Echinococcus infections); the animals are autopsied 15 days after treatment.

In teniacidal trials with sheep and poultry, Chubabriya stated that all scolices are

recovered from the feces and that the efficacy is calculated on this basis when the animals are autopsied 3 or 4 days after treatment. One might reasonably question the accuracy of such calculations, however, particularly in sheep, because of the technical problems involved in recovering all, or even a major part, of the scolices that pass through the intestinal tract of these animals. Chubabriya's use of control animals in these trials indicates that he probably shares this view. If he had confidence in the accuracy of the critical data, there would be no need for control animals; indeed, such data would be irrelevant. Unfortunately, circumstances did not permit a thorough discussion of the point in question.

Noninfectious Diseases

Throughout the Soviet Union livestock losses from noninfectious diseases are alleged to be minimal. Veterinarians and agriculturalists show no concern for diseases of this kind and very little research is being conducted on them. We inquired about deficiency diseases, metabolic diseases, and plant poisoning at all points of visitation.

Deficiency Diseases

In the Republic of Kirgizia, cobalt, phosphorus, and iodine deficiencies exist and adversely affect sheep and cattle. Cobalt deficiency in cattle and sheep is treated by oral administration of small amounts of cobalt salts. Phosphorus and iodine deficiencies, although not common, do occur and are prevented and treated by supplying those elements.

Metabolic Diseases

In the Republic of Georgia, some dairy cattle are affected with acetonemia and milk fever. Acetonemia is treated by oral and parenteral administration of glucose. Unsubstantiated claims were made for prevention of acetonemia by supplying adequate rations throughout lactating and nonlactating periods. Milk fever is treated by parenteral administration of calcium salts and by inflation of the udder. Unsubstantiated claims were made for prevention by supplying quantitatively adequate and balanced mineral rations. As far as we could determine, no research is being conducted on acetonemia and milk fever.

Urolithiasis was alleged not to occur in either cattle or sheep. Commercial male sheep are castrated at approximately 1 month of age and are marketed as mutton at 3 to 4 years of age. Commercial male cattle are castrated as calves and are marketed as beef at 1 to 2 years of age. Despite these practices, the incidence of urolithiasis is very low.

In the mountainous part of the Republic of Kirgizia, cattle and horses, as well as sheep, are raised at altitudes as high as 13,000 feet. High altitude disease of cattle is not recognized. "Heart failure" in some young horses that reside continuously at high altitude is recognized. This disease is characterized by unthriftiness, decelerated growth rate, and terminal collapse, dyspnea, and death. Veterinarians of the area attribute the disease to stress from high altitude.

Poisonous Plants

According to veterinary and agricultural officials, serious losses from plant poisoning do not occur. In the Georgian Republic we observed puncture vine (Tribulus terristeris) and yellow star thistle (Centurea sp.) in abundance along roadsides in the area of the Kura River between Tbilisi and the high peaks of the Caucasus mountains. St. Johns wort (Hypericum sp.) was growing in the forested areas and public parks near Kharkov. Bracken (Pteridium sp.) was abundant among trees in pastures at "Sunrise of Communism" collective farm north of Leningrad. At Alma-Ata a botanist indicated that Halogeton glomeratus grows in the arid areas of the Republic Kazakhstan. No serious losses were reported.

RADIOISOTOPES

Workers at several research and educational institutes indicated that use of radioisotopes and the establishment of isotope laboratories are contemplated but they are not being used at present. We observed a single isotope laboratory, located at the All-Union Scientific Research Institute of Veterinary Sanitation and Ectoparasitology, Moscow, and directed by V. V. Arkhipov. This laboratory was equipped with books, shielding, dosimeters, and scalers. Radioisotopes were being utilized to determine the metabolism of external parasiticides.

BOVINE STERILITY

Information on treating sterility was received from P. A. Voloskov's Laboratory in the All-Union Institute of Experimental Veterinary Medicine, Moscow.

Parasympathetic nerve stimulants such as pilocarpine, together with small doses of the female sex hormone estrogen, are used to regulate sexual functions. Large amounts of estrogen have produced castration effects. Apparently a wide range of conditions, such as inflammation, pyometra, dystrophy, and cystic ovaries, are treated with the neurotropic technique, generally in conjunction with antibacterial compounds such as iodine or Furacin. Instructions for treating sterility are prepared in this laboratory for distribution to practitioners.

We discussed this treatment with personnel working on the physiology of reproduction and infertility in other laboratories. The general opinion was that its merit was based on theoretical assumptions. It would be difficult to prove its specificity by research methods; however, it finds wide usage among practitioners.

Voloskov informed us that there was very little sterility trouble in the U.S.S.R. This was later confirmed by personnel working on reproduction and infertility in other laboratories and also by managers of state and collective farms.

ARTIFICIAL INSEMINATION

Information obtained from various sources during our travel indicated that males for supplying semen are probably available to most cattle, sheep, swine, and horse breeders and that trained personnel are available to inseminate females. It is obligatory for all veterinarians to perform artificial insemination (a.i.) upon request. All zootechnicians are trained for a.i. and sterility work. Veterinarians are dependent on the State for their salary and are stationed to the best advantage of the country. Veterinary hospital facilities, as well as veterinary service, are available to farms or the livestock industry, as explained elsewhere in this report. Many of these hospitals maintain studs. All state farms, zootechnical institutes, and agricultural experiment stations that we visited maintained males that could be used for a.i. Special studs of purebred males for the establishment of new breeds are available to various sections of the country.

Our schedule included a visit to a bull stud in Frunze, Kirgizia, known as the Kirgizian Republic Station of Pure Breeding Cattle. It was established because a.i. was known to be the most important method of improvement in cattle breeding. Before the breeding program was begun, the cows were low quality, with an average body weight of 700 pounds and daily milk yield of about 2 gallons. The government began furnishing purebred Brown Swiss bulls for crossing with native cows in 1922. This grew into the organization of the a.i. center in 1926.

The main task of the a.i. center was to establish a new breed. This new breed was registered in 1952 as the Ala-Tau. The breed resembles the Brown Swiss bulls that were used on the native cows. Now 24 farms, in at least 5 regions, have a total of 10 lines of purebred cattle with which this center is working. Cattle are also being inseminated in 7 other regions. In 1957, 25,000 cattle were inseminated near Frunze. Semen was also shipped by air to more distant areas.

Bulls are selected from dams that produce 3.8 percent of fat or more. Young bulls are first used at 18 months of age. Weekly collections are made for a limited time to inseminate a few cows, apparently for some type of evaluation of their offspring. After this interval they are not used until 3 years of age and are disposed of as 6-year-olds. Semen is collected twice weekly except for frequent rest periods.

Bull mounts are used for collection. False mounting is practiced to improve the quality of semen. Average yields of 8 cc. per ejaculate are obtained. Two ejaculates are collected at approximately a 15-minute interval. The quality of semen is evaluated microscopically. Desirable semen is diluted 1 to 10 or 1 to 15 with egg-yolk citrate containing antibiotics and stored in 10-cc. amounts in test tubes. It is shipped the second day after collection, but is not used after the third day. A 3-mm. capillary glass tube is used for insemination of cows. Results show a 70 to 74 percent conception rate for first service.

A second new breed of cattle, Aulie-Ata, bred from black and white animals left by an early German invasion, has been developed in a northern region. Ten other studs in Kirgizia furnish both sheep and cattle semen. These studs do not have all purebred males.

A technique for inseminating cows is under experimental trial. The semen is placed in a special 1-cc. glass container that can be used for storage. This container is made to fit into an air-pressure gun-type apparatus used for forcing the semen out through an extension made for insertion into the cervix. With this container loss of semen should be kept at a minimum. The air-pressure apparatus is sterilized after each use by wiping with alcohol.

The ration for bulls consists of lucerne and grass cut fresh daily in summer and silage in winter. Small bulls are given 8 kilograms and large bulls 10 kilograms daily. This ration is supplemented with animal products such as bonemeal and skim milk, and with cod-liver oil in winter. Concentrates fed in winter consist of barley, corn, oats, wheat bran, cottonseed meal, sugar beet pulp, and carrots. Young bulls receive 8 units of this feed and old animals 10 units. (We do not know the amount in a unit.) The best bulls are given 10 eggs daily in addition.

Bulls are exercised by hitching 2 to a wagon and leading 4 to 8 behind. All animals appeared to be well behaved while on their forced travel for miles.

F. I. Ostashkov, a veterinarian, at the Kharkov Research Institute for Animal Husbandry, was doing research on antificial insemination. He explained that the main problems in the U.S.S.R. are improvement of equipment and techniques. His laboratory is responsible for improvement of artificial insemination techniques and storage of semen.

Liquid oxygen was being used experimentally for storage of frozen cattle semen. Dr. Ostashkov was freeze-drying semen from various species, but to date the sperm has been motionless upon reconstitution. However, he produced a reference (Reports of Academy of Agricultural Science of Lenin, 1957, No. 6, by Uschenko) reporting that frozen lyophilized semen from a rabbit had been used to impregnate a doe. Workers at this laboratory were also conducting experiments in CO_2 treatment of semen for storage at room temperature.

The use of milk as a diluter was apparently in the experimental stage.

A record of 16,000 cows bred to a single bull was reported, but the average is 2,000 cows per bull per year.

Artificial insemination is used widely in sheep breeding. The main object is to improve the grade of wool. An average of over 1,000 ewes are inseminated from each ram. The conception rate is higher than for natural service, reaching 90 to 100 percent for fine-wool breeds. Under present methods of storage, semen does not retain its fertility longer than 3 days.

A conception rate of 55 to 60 percent was reported in horses, but semen cannot be stored longer than 3 days.

Artificial insemination is not used much in swine. The techniques are similar to those used in Norway. Semen has not been kept longer than 3 days. At the Kharkov Research Institute for Animal Husbandry, 2 litters of pigs are produced annually, with a yearly average of 20 to 24 pigs. The average outside the experiment station is 1.8 litters annually, with a yearly average of 18.3 pigs.

The ease of handling male and female animals of all species aids greatly in the use of artificial insemination. All animals are herded by men, women, and children and have no fear of man. Females may be caught and confined for artificial insemination in mountainous ranges as readily as in barnyard enclosures.

MILK AND MEAT SANITATION

The sanitary control of meat slaughtering and processing, and milk and dairy processing are part of the veterinary service of the U.S.S.R., and consists of a system of municipal and district control stations, of which there are reported to be 3,000 in the Soviet Union.

We visited the public market in Moscow, where there is a milk and meat control station. Carcasses coming in from the farms for sale must be accompanied by a certificate from the veterinarian on the farm where they were slaughtered. The carcasses are then checked mainly for condition before they are placed on sale at public market. The usual milk inspection procedures, such as butterfat, sediment, and bacterial culture, are carried out for milk brought to the market.

It was possible to visit only one slaughtering establishment, and this was at Alma-Ata in the Republic of Kazakhstan. This was reported to be one of the older slaughtering establishments, built in 1939, with additions constructed in 1945. In discussions with the veterinarian in charge of inspection, his superior in charge of the veterinary activity in that district, and the plant management, it became apparent that the inspection procedures are similar to those followed in Europe and the United States. This plant has facilities for slaughtering an average of 5,000 sheep and approximately 800 cattle a day, using 2 shifts of 8 hours each. Fifteen veterinarians were assigned to this plant for inspection, which included antemortem as well as post-mortem inspection. Animals found to be diseased on antemortem inspection are not allowed in the main slaughtering plant, but are slaughtered at a separate establishment especially for this purpose. The on-the-line post-mortem inspection appeared to be similar to that in the United States, in that the intestines, pluck, lymph glands, and liver are all inspected and diseased organs or parts of organs are condemned. There is also a final inspection of the carcasses prior to cooling.

Ministry officials stated that this was not one of their newest, most up-to-date plants. Unfortunately, time did not permit a visit to one of the newer, more modern plants, but even so, the plant visited is comparable to the average large slaughtering plant in the United States, and apparently the same type of inspection control is applied in all of the larger slaughtering establishments.

The milk and meat inspection in the smaller communities and on the farm was reported to be carried out by the field organization of the Ministry of Agriculture of each Republic. This is apparently a part of the routine responsibility of these field forces whose principal responsibility is the control of animal diseases.

Milk was being cooled and pasteurized on one of the farms we visited where milk is produced, while at the others it was taken to a nearby city for cooling and bottling. We were assured that all milk sold for human consumption is pasteurized. However, we saw many milk trucks, similar to our bulk tanks, parked along the streets in the cities, and people were going to them with their buckets to buy milk. We did not learn whether this milk had been pasteurized. However, milk was sold in bottles and available at hotels. Some of this was not fresh milk but the clabber-type of sour milk.

BIOGRAPHICAL DATA ON RUSSIAN WORKERS

The information comprising this part of the report was compiled from notes taken by the several members of the delegation during the tour of the Soviet Union. For the most part, the individuals listed are among the principal scientists in their respective fields of specialization. Many of them, especially the research workers, expressed repeatedly a desire to correspond and exchange reprints with American colleagues having interests similar to their own. Most of the Soviet scientists read English; and the services of translators are available at all research, educational, and other institutes for the few that do not. The initiation of correspondence by American scientists with their counterparts in the U.S.S.R., therefore, might further immeasurably the primary objective of the exchange program, namely, the improvement of mutual understanding and cooperation between our two peoples. Hopefully, the information given herein may be of assistance to this end.

The directory is composed of two alphabetized parts: (1) A geographical and institutional listing of workers, and (2) a brief summary of the available information on each person.

Geographical and Institutional List of Russian Workers

ALMA-ATA

Alma-Ata Biocombine

Pankratov, L. D., Director
Sofiyev, B. I.

Alma-Ata Zooveterinary Institute

Bazanova, N. U.
Bazanova, U. B.
Galiyev, F. M.
Kanakbayev, G. K., Director
Kleynbok, Ya. I.
Orlov, N. P.
Vsevolodov, B. P.

Institute of Zoology, Kazakh Academy of Sciences

Boyev, S. N.
Galuzo, I. G., Director
Gvozdev, Ye. V.

Kazakh Ministry of Agriculture

Sofiyev, B. I.
Zinov'yev, V. S.

Kazakh Veterinary Research Institute

Anisimov, ?. ?.
Bondareva, V. I.
Dikov, G. I.
Dzerzhinskiy, A. Ya., Director
Karabayev, D. K.
Kindyakov, V. I.
Kovalevskiy, ?. ?.
Orlov, N. P.
Shul'ts, R. E. S.
Studentsov, K. P.

FRUNZE

Agricultural Institute imeni Skryabin

Khuday-Bergenev, D. K., Director
Tursunov, S. T.
Zhunkovskiy, I. E.

Kirgiz Ministry of Agriculture

Umaraliyev, T., Assistant Minister

Kirgiz Republic Veterinary Laboratory

Kopetov, ?. ?.
Kopienko, I. Ya.
Morozov, S. D., Director

Kirgiz Research Institute of Veterinary Science

Alibayev, R. A., Director

KHARKOV

Kharkov Institute of Veterinary Science

Logvinov, D. D., Director
Lukashev, I. I.
Tolstova-Pariyskaya, N. G.

Kharkov Research Institute of Animal Husbandry of Forest, Steppe, and Woodland Regions of the Ukrainian S. S. R.

Danilenko, I. A., Director
Doroshenko, V. I.
Kaplan, V. A.
Ostashkov, F. I.
Perevozina, K. A.
Staroverov, N. A.
Ushenko, ?. ?.
Yatsenko, A. Ye.

Kharkov Zootechnical Institute

Bozhko, V. S.
Kniga, M. I., Director
Potemkin, D. N.

Ukrainian Institute of Experimental Veterinary Science

Ageyev, I. Y.
Gladenko, I. N., Director
Klesov, M. D.
Kolomiyets, Yu. S.
Kulesko, I. I.
Lysenko, I. P.
Oleynik, N. K.
Petrenko, B. G.
Prokof'yeva, M. T.
Revo, M. V.

Ukrainian Veterinary Administration

Didovets, S. R., Chief
Kalugin, L. K.
Rakovskiy, I. G.
Satsyuk, B. P.

KURSK

Kursk Biocombine

Drobyazgo, D. P., Director

LENINGRAD

Leningrad Veterinary Institute

Kokurichev, P. I.
Kuznetsov, G. S., Director
Sinev, N. P.

Leningrad Research Institute of Veterinary Science

Avessalomov, I. S.
Gusev, V. F., Director
Pirog, N. N.
Rastegayeva, E. N.
Trilenko, P. A.

Miscellaneous

Tumour, ?. ?.

MOSCOW

All-Union Institute of Experimental Veterinary Medicine (VIEV)

Abramov, I. V.
Aleksandrova, V. A.
Gribanov, V. N.
Ivanov, B. G.
Kovalenko, Ya. R., Director
Kudryavtsev, A. A.
Markov, A. A.
Muromtsev, S. N.
Orlov, Ye. S.
Ratner, L. S.
Sergeyev, V. A.
Shurevskiy, V. E.
Skorin, I. Ye.
Smirnov, A. N.
Ulasevich, P. S.
Voloskov, P. A.
Zotov, A. P.

All-Union Skryabin Institute of Helminthology

Antipin, D. N.
Chertkova, A. N.
Demidov, N. V.
Gnedina, M. P.
Kryukova, K. A.
Matevosyan, Ye. M.
Ozerskaya, V. N.
Panasyuk, D. I.
Petrochenko, V. I.
Petrov, A. M.
Polyakova, O. I.
Potekhina, L. F.
Potemkina, V. A.
Shumakovich, Ye. Ye.
Skarbilovich, T. S.
Skryabin, K. I.
Tsvetayeva, N. P.
Veselova, T. P.
Yershov, V. S., Director

All-Union Research Institute of Veterinary Sanitation and Ectoparasitology

Andreyev, K. P.
Arkhipov, V. V.
Khatin, M. G.
Mironov, A. N.
Nikiforov, N. I.
Polyakov, A. A., Director
Polyakov, D. K.
Priselkov, A. M.
Spesivtseva, N. A.

Ministry of Agriculture

Boyko, A. A.
Fedosov, A. P.
Goloshchapov, Yu. N.
Gritsenyuk, N. A.
Iravina, M.
Ivanovskiy, V. A.
Kharchenko, A. F.
Matskevich, V. V., Minister
Osipenko, G. A.
Verteletskiy, L. L.

Moscow Veterinary Academy

Abramov, I. V.
Abuladze, K. I.
Afonskiy, S. I., Prorector
Gannushkin, M. S.
Gorshkov, ?. ?.
Kolyakov, Ya. Ye.
Markov, A. A.
Mosgov, I.
Plakhotin, M. V.
Popov, N. F.
Skryabin, K. I.
Vertinskiy, K. I.
Yel'tsov, S. G.

State Scientific Control Institute for Veterinary Preparations

Babich, M. A.
Glukhovtsev, G. D.
Ivanov, M. M.
Kagan, F. I.
Kolesov, S. G.
Syurin, V. N., Director
Skalinskiy, Ye. I.

Miscellaneous

Bogdanov, V. N.
Gasarov, N.
Karazin, ?. ?.
Nefedov, ?. ?.
Rogov, A. A.
Zaytsev, N. V.

TBILISI

Georgian Research Institute of Animal Husbandry and Veterinary Science

Badrishvili, ?. ?.
Chubabriya, I. T.
Kachakidze, A. V.
Kobakhidze, ?. ?.

Kvesitadze, I. F., Director
Matikashvili, N. V.
Yerkomayshvili, ?. ?.

Georgian Veterinary Administration

Khukhunayshvili, P. E.
Sharashidse, G. G.

Georgian Zooveterinary Institute

Chkhartishvili, ?. ?.
Degluawa, ?. ?.
Gelovani, ?. ?.
Georgadze, ?. ?.
Kanchaveli, ?. ?.
Khukhmayshvili, ?. ?.
Kumsishivili, ?. ?.
Mamatelashvili, V. G., Director
Matikashvili, I. L.
Vasadze, E. I.

Miscellaneous (Georgian S.S.R.)

Grandilevskiy, G. D.
Meladze, D. Z.
Sokhadse, E.

Undetermined

Kotov, V. T.
Kurchatov, V. I.
Leonov, N. I.

Brief Summary of Available Information On Russian Workers

Abramov, I. V.

Protozoology Laboratory
All-Union Institute of Experimental Veterinary Medicine
Moscow

Abuladze, K. I.

Institute of Parasitology
Moscow Veterinary Academy
Cestodes
Moscow

Afonskiy, S. I., Professor

Prorector
Moscow Veterinary Academy
Biochemistry
Moscow

Ageyev, I. Y.

(Ageev)
Ukrainian Institute of Experimental Veterinary Science
Virology; electron microscopy
Kharkov

Aleksandrova, V. A.

(Alesandra)
All-Union Institute of Experimental Veterinary Medicine
Microbiology and Virology
Moscow

Alibayev, R. A.

(Alobayev)
Director
Kirgiz Research Institute of Veterinary Science
Frunze

Andreyev, K. P., Dr. Vet. Sci.

(Andreev)
Chief
Laboratory of Entomology and Insecticides
All-Union Research Institute of Veterinary Sanitation and Ectoparasitology
Moscow

Anisimov, ?. ?.

Chief
Laboratory of Sheep Diseases
Kazakh Veterinary Research Institute
Alma-Ata

Antipin, D. N., Professor, Dr. Vet. Sci.

Deputy Director of Scientific Section
Chief
Laboratory of Experimental Treatment of Helminthic Diseases
All-Union Skryabin Institute of Helminthology
Moscow

Arkhipov, V. V.

(Arhipov)
Acting Director
Head
Isotope Laboratory

All-Union Research Institute of Veterinary Sanitation and Ectoparasitology
Moscow

Avessalomov, I. S.

(Avessolomov)
Chief
Department of Parasitology
Leningrad Research Institute of Veterinary Science
Leningrad

Babich, M. A.

State Scientific Control Institute for Veterinary Preparations
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Badrishvili, ?. ?.

(Badrishvie)
Georgian Research Institute of Animal Husbandry and Veterinary Science (?)
Tbilisi

Bazanova, N. U. (woman)

Head
Department of Parasitology
Alma-Ata Zooveterinary Institute
Alma-Ata

Bazanova, U. B., Academician

Head of the Chair
Department of Physiology
Alma-Ata Zooveterinary Institute
Alma-Ata

Bogdanov, V. N.

Director
All-Union Agricultural and Industrial Exhibition
Formerly, Director of State Scientific Control Institute for Veterinary Preparations
Moscow

Bondareva, V. I. (woman)

Department of Parasitology
Kazakh Veterinary Research Institute
Helminthology; anthelmintics
Alma-Ata

Boyev, S. N., Academician

(Boev)
Head
Department of Helminthology
Institute of Zoology
Kazakh Academy of Sciences
Alma-Ata

Boyko, A. A., (1915)

(Boiko)
Chairman
Veterinary Collegium
Ministry of Agriculture
Moscow

Bozhko, V. S. Professor

(Boshkova, P. E. ?)
Head
Department of Animal Feeding
Kharkov Zootechnical Institute
Kharkov

Chertkova, A. N. (woman), Candidate Biol. Sci.

Chief
Helminthological Museum
All-Union Skryabin Institute of Helminthology
Helminths of gallinaceous birds
Moscow

Chkhartishvili, ?. ?.

Vice Director
Georgian Zooveterinary Institute
Pharmacology
Tbilisi

Chubabriya, I. T., (I. F.), Candidate Vet. Sci.

Head
Department of Helminthology
Georgian Research Institute of Animal Husbandry and Veterinary Science
Anthelmintics
Tbilisi

Danilenko, I. A.

Director
Kharkov Research Institute of Animal Husbandry of Forest, Steppe, and Woodland Regions of the Ukrainian S.S.R.
Feeds and feeding
Kharkov

Degluawa, ?. ?.

(Deglyava (?))
Georgian Zooveterinary Institute
Tbilisi

Demidov, N. V., Candidate Vet. Sci.

All-Union Skryabin Institute of Helminthology
Treatment and prophylaxis of fascioliasis of ruminants
Moscow

Didovets, S. R. (1918)

Chief
Ukrainian Veterinary Administration
Kiev

Dikov, G. I.

Department of Parasitology
Kazakh Veterinary Research Institute
Helminthology; anthelmintics
Alma-Ata

Doroshenko, V. I. (N. I.?) (woman)

Head
Laboratory of Sheep Breeding
Kharkov Research Institute of Animal Husbandry of Forest, Steppe, and Woodland Regions of the Ukrainian S.S.R.
Wool specialist
Kharkov

Drobyazgo, D. P.

(Drobiasko; Drobiasgo; Drobyazko)
Director
Kursk Biocombine
Kursk

Dzerzhinskiy, A. Ya., (1913) Professor

(Dzerzhinsky)
Director
Kazakh Veterinary Research Institute
Alma-Ata

Fedosov, A. P.

Ministry of Agriculture
Moscow

Galiyev, F. M., Academician

Head
Department of Histology
Alma-Ata Zooveterinary Institute
Alma-Ata

Galuzo, I. G., Academician

Director
Institute of Zoology
Kazakh Academy of Sciences
Protozoology; arachnology
Alma-Ata

Gannushkin, M. S., Professor

Moscow Veterinary Academy
Epizootiology
Moscow

Gasarov, N.

(Casarev)
In Charge
Veterinary Hospital
Moscow

Gelovani, ?.?.

Georgian Zooveterinary Institute
Parasitology
Tbilisi

Georgadze, ?. ?.

Dean
Zootechnical Faculty
Georgian Zooveterinary Institute
Microbiology
Tbilisi

Gladenko, I. N., Candidate Vet. Sci.

Director
Ukrainian Institute of Experimental Veterinary Science
Pharmacology
Kharkov

Glukhovtsev, G. D.

State Scientific Control Institute for Veterinary Preparations
Developed killed vaccine for swine erysipelas
Moscow

Gnedina, M. P. (woman), Candidate Vet. Sci.

All-Union Skryabin Institute of Helminthology
Biology and prophylaxis of bovine onchocercosis
Moscow

Goloshchapov, Yu. N.

Member (Ass't to Boyko?)
Ministry of Agriculture Collegium
Moscow

Gorshkov, ?. ?.

(Garshkov)
Department of Parasitology
Moscow Veterinary Academy
Moscow

Grandilevskiy, G. D.

(Grandilevsky)
Veterinarian
State Farm
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Gribanov, V. N.

Foot and Mouth Disease Laboratory
All-Union Institute of Experimental Veterinary Medicine
Moscow

Gritsenyuk, N. A.

(Gritzenuk; Gretzenuk; Gritzinyuk)
Veterinarian
Ministry of Agriculture
Moscow

Guzev, V. F., Professor, Dr. Vet. Sci.

Director
Leningrad Research Institute of Veterinary Science
Protozoology
Leningrad

Gvozdev, Ye. V.

Institute of Zoology
Kazakh Academy of Sciences
Alma-Ata

Iravina, Maya (woman)

(Iravima, Maryia)
Ministry of Agriculture
Interpreter
Moscow

Ivanov, B. G., Professor

All-Union Institute of Experimental Veterinary Medicine
Moscow

Ivanov, M. M.

Chief
Laboratory of Diagnostic Preparations
State Scientific Control Institute for Vetinary Preparations
Brucellosis; vibriosis
Moscow

Ivanovskiy, V. A.

Chief
All-Union Trust for Biological Industry
Moscow

Kachakidze, A. V., Candidate Vet. Sci.

Head
Department of Poultry Diseases
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Tbilisi

Kagan, F. I. (woman)

State Scientific Control Institute for Veterinary Preparations
English translator for Institute
Veterinarian
Moscow

Kalugin, L. K.

Chief Veterinarian
Kharkov Region
Ukrainian S.S.R.
Kharkov

Kanakbayev, G. K., Professor

(Kanakbaev)
Director
Alma-Ata Zooveterinary Institute
Pathology
Alma-Ata

Kanchaveli, ?. ?., Academician

Georgian Zooveterinary Institute
Animal Husbandry
Tbilisi

Kaplan, V. A.

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Physiology Laboratory
Kharkov Research Institute of Animal Husbandry of Forest, Steppe, and Woodland Regions of the Ukrainian S.S.R.
Physiology and biochemistry
Kharkov

Karabayev, D. K., Candidate Vet. Sci.

Deputy Director
Kazakh Veterinary Research Institute
Alma-Ata

Karazin, ?. ?.

(Karozin; Kharazan)
Chief Veterinarian
Moscow Food Inspection
Moscow

Kharchenko, A. F.

Head
Division of International Cooperation
Ministry of Agriculture
Moscow

Khatin, M. G.

Arachnology Laboratory
All-Union Research Institute of Veterinary Sanitation and Ectoparasitology
Experimental treatment of external parasites
Moscow

Khuday-Bergenev, D. K.

(Hudai-Bergenev, Z. K.)
Director
Agricultural Institute imeni Skryabin
Zootechnic
Frunze

Khukhmayshvili, ?. ?.

Georgian Zooveterinary Institute
Tbilisi

Khukhunayshvili, P. E.

(Huhunashvili)
Chief
Georgian Veterinary Administration
Tbilisi

Kindyakov, V. I., Candidate Vet. Sci.

Kazakh Veterinary Research Institute
Foot and mouth disease
Alma-Ata

Kleynbok, Ya. I.

(Kleinbok, I. Y.)
Head
Department of Non-infectious diseases
Alma-Ata Zooveterinary Institute
Corresponding member Kazakh Academy of Sciences
Alma-Ata

Klesov, M. D., Professor, Dr. Vet. Sci.

Chief
Helminthology Laboratory
Ukrainian Institute of Experimental Veterinary Science
Kharkov

Kniga, M. I., Professor

Director
Kharkov Zootechnical Institute
Animal breeding
Kharkov

Kobakhidze, ?. ?.

Georgian Research Institute of Animal Husbandry and Veterinary Science (?)
Tbilisi

Kokurichev, P. I., Professor

(Kokourichev)
Leningrad Veterinary Institute
Pathology
Leningrad

Kolesov, S. G., Dr. Vet. Sci.

Head
Anthrax Laboratory
Assistant Director
State Scientific Control Institute for Veterinary Preparations (Visited U.S.A., including Colorado and New Mexico, in recent years. Reason for visit and exact time not determined).
Moscow

Kolomiyets, Yu. S., Dr. Vet. Sci.

Chief
Protozoology Laboratory
Ukrainian Institute of Experimental Veterinary Science
Kharkov

Kolyakov, Ya. Ye., Professor

Moscow Veterinary Academy
Microbiology
Moscow

Kopetov, ?. ?.

Chief
Department of Epizootiology
Kirgiz Republic Veterinary Laboratory
Frunze

Kopienko, I. Ya.

(Korniyenko)
Chief
Department of Parasitology
Kirgiz Republic Veterinary Laboratory
Frunze

Kotov, V. T.

Veterinarian
Developer of live vaccine for swine erysipelas
?

Kovalenko Ya. R. (1906), Professor

Director
All-Union Institute of Experimental Veterinary Medicine
Microbiology
Moscow

Kovaleskiy, ?.?.

Kazakh Veterinary Research Institute
Deficiency diseases
Alma-Ata

Kryukova, K. A. (woman), Candidate Vet. Sci.

All-Union Skryabin Institute of Helminthology
Biology of paramphistomatosis of calves
Moscow

Kudryavtsev, A. A., Professor

All-Union Institute of Experimental Veterinary Medicine
Nutritional diseases
Moscow

Kulesko, I. I., Dr. Vet. Sci.

Chief
Virology Laboratory
Ukrainian Institute of Experimental Veterinary Science
Kharkov

Kumsishivili, ?.?.

Georgian Zooveterinary Institute
Large animal clinician
Tbilisi

Kurchatov, V. I.

Formerly, at the All-Union Institute of Experimental Veterinary Medicine
Moscow
(On inquiry, this person was said to have been transferred to Krasnodar.)

Kuznetsov, G. S., Professor

Director
Leningrad Veterinary Institute
Leningrad

Kvesitadze, I. F., Professor, Dr. Vet. Sci.

Director
Georgian Research Institute of Animal Husbandry and Veterinary Science
Epizootiology
Tbilisi

Leonov, N. I.

Research on growth promotion by antibiotics
"Near Moscow"

Logvinov, D. D.

Director
Kharkov Institute of Veterinary Science
Kharkov

Lukashev, I. I., Professor, Dr. Vet. Sci.

Kharkov Institute of Veterinary Science
Epizootiology
Kharkov

Lysenko, I. P., Professor

Ukrainian Institute of Experimental Veterinary Science
Microbiology
Kharkov

Mamatelashvili, V. G., Candidate Biol. Sci.

Director
Georgian Zooveterinary Institute
Tbilisi

Markov, A. A., Professor

Head
Protozoology Laboratory
All-Union Institute of Experimental Veterinary Medicine
Professor of Protozoology
Moscow Veterinary Academy
Moscow

Matevosyan, Ye. M. (woman), Professor, Dr. Biol. Sci.

All-Union Skryabin Institute of Helminthology
Cestodes
Moscow

Matikashvili, I. L.

Georgian Zooveterinary Institute
Protozoology
Tbilisi

Matikashvili, N. V. (woman)

Georgian Research Institute of Animal Husbandry and Veterinary Science
Arachnology
Tbilisi

Matskevich, V. V.

Minister of Agriculture
Moscow

Meladze, D. Z.

(Neladze)
Manager
State Farm
Gagry
Georgia

Mironov, A. N., Professor, Dr. Vet. Sci.

Head
Laboratory of Food Sanitation
All-Union Research Institute of Veterinary Sanitation and Ectoparasitology
Moscow

Morozov, S. D.

(Morosov)
Director
Kirgiz Republic Veterinary Laboratory
Frunze

Mosgov, I., Professor, Dr. Vet. Sci.

Moscow Veterinary Academy
Pharmacology
Moscow

Muromtsev, S. N., Academician

Chief
Microbiology Laboratory
All-Union Institute of Experimental Veterinary Medicine
Director
Gamalaya Institute of Microbiology of Medical Sciences
Moscow

Nefedov, ?.?.

Director
Agricultural Exhibit
All-Union Agricultural and Industrial Exhibition
Moscow

Nikiforov, N. I., Candidate Vet. Sci.

Head
Laboratory of Sanitation and Rodenticides
All-Union Research Institute of Veterinary Sanitation and Ectoparasitology
Moscow

Oleynik, N. K.

Ukrainian Institute of Experimental Veterinary Science
Virology; electron microscopy
Kharkov

Orlov, N. P., Professor

Kazakh Veterinary Research Institute
Head
Department of Protozoology
Alma-Ata Zooveterinary Institute
Alma-Ata

Orlov, (Ye. S.), Professor

Head
Brucellosis Laboratory
All-Union Institute of Experimental Veterinary Medicine
Moscow

Osipenko, G. A. (1907)

Vice Chief
All-Union Trust for Biological Industry
Moscow

Ostashkov, F. I., Dr. Vet. Sci.

(Ostashko)
Assistant Head
Laboratory of Artificial Insemination
Kharkov Research Institute of Animal Husbandry of Forest, Steppe, and Woodland Regions of Ukrainian S.S.R.
Kharkov

Ozerskaya, V. N. (woman), Candidate Vet. Sci.

Laboratory of General Helminthology
All-Union Skryabin Institute of Helminthology
Treatment of Sheep Lungworms
Moscow

Panasyuk, D. I., Candidate Vet. Sci.

All-Union Skryabin Institute of Helminthology
Diagnosis and therapy of early stages of ovine dictyocaulosis
Moscow

Pankratov, L. D.

Director
Alma-Ata Biocombine
Alma-Ata

Perevozina, K. A. (woman)

Chief
Laboratory of Biochemical Studies on Forage
Kharkov Research Institute of Animal Husbandry of Forest, Steppe, and Woodland Regions of the Ukrainian S.S.R.
Kharkov

Petrenko, B. G., Professor, Dr. Vet. Sci.

Deputy Director
Ukrainian Institute of Experimental Veterinary Science
Epizootiology
Kharkov

Petrochenko, V. I., Dr. Biol. Sci.

Chief
Laboratory of Helminths of Birds
All-Union Skryabin Institute of Helminthology
Acanthocephala
Moscow

Petrov, A. M., Dr. Vet. Sci., Professor

Chief
Laboratory of General Helminthology
All-Union Skryabin Institute of Helminthology
Helminths of fur animals
Systematics
Moscow

Pirog, N. N., Dr. Vet. Sci.

Chief
Pathologic Anatomy
Department of Epizootiology
Leningrad Research Institute of Veterinary Science
Leningrad

Plakhotin, M. V., Professor

Dean
Veterinary Faculty
Moscow Veterinary Academy
Surgery
Moscow

Polyakov, A. A., Professor, Dr. Vet. Sci.

Head
Laboratory of Disinfection
Director
All-Union Research Institute of Veterinary Sanitation and Ectoparasitology
Editor of Veterinaria
Moscow

Polyakov, D. K.

Head
Archnology Laboratory
All-Union Research Institute of Veterinary Sanitation and Ectoparasitology
Moscow

Polyakova, O. I. (woman), Candidate Biol. Sci.

Chief
Laboratory of Biochemistry and Physiology of Helminths
All-Union Skryabin Institute of Helminthology
Moscow

Popov, N. F., Academician

Professor of Physiology
Moscow Veterinary Academy
Moscow

Potekhina, L. F., Candidate Biol. Sci. (woman)

Research Secretary
All-Union Skryabin Institute of Helminthology
Moscow

Potemkin, D. N., Academician

Kharkov Zootechnical Institute
Specialist in animal breeding
Kharkov

Potemkina, V. A., Professor, Dr. Vet. Sci. (woman)

All-Union Skryabin Institute of Helminthology
Therapy and epizootiology of ovine monieziosis
Moscow

Priselkov, A. M.

All-Union Research Institute of Veterinary Sanitation and Ectoparasitology (?) Formerly, Director, All-Union Institute of Veterinary Dermatology
Moscow
(On inquiry, this person was said to be present at Institute; but before consultation could be arranged, he was reported to have made a sudden trip to the Crimea).

Prokof'yeva, M. T., Dr. Vet. Sci.

Chief
Laboratory of Poultry Diseases
Ukrainian Institute of Experimental Veterinary Science
Kharkov

Rakovskiy, I. G.

(Rakovsky, J. G.)
Director
Veterinary Laboratory
Bogodukhovsky Region
Veterinarian
Kharkov

Rastegayeva, E. N., Professor

Head
Department of Epizootiology
Leningrad Research Institute of Veterinary Science
Leningrad

Ratner, L. S., Professor

Foot and Mouth Disease Laboratory
All-Union Institute of Experimental Veterinary Medicine
Moscow

Revo, M. V., Professor

Ukrainian Institute of Experimental Veterinary Science
Microbiology
Working on purification of tuberculin
Kharkov

Rogov, A. A.

Physician
First Medical Institute
Central Research Laboratories
Interpreter for American Veterinary Exchange Delegation
Moscow

Satsyuk, B. P.

(Satsuk; Sotsuk)
Assistant Chief
Ukrainian Veterinary Administration
Blvd. of Shevshenko 14
Kiev

Sergeyev, V. A., Candidate Vet. Sci.

(Sergeev)
Foot and Mouth Disease Laboratory
All-Union Institute of Experimental Veterinary Medicine
Moscow

Sharashidse, G. G.

Georgian Ministry of Agriculture
Veterinarian
Tbilisi

Shul'ts, R. E. S., Professor

(Shultz, R. S.)
Head
Department of Parasitology
Kazakh Veterinary Research Institute
Helminthology
Alma-Ata

Shumakovich, Ye. Ye.

Chief
Laboratory of Helminths of Cattle, Sheep, and Goats
All-Union Skryabin Institute of Helminthology
Animal helminthology
Moscow

Shurevskiy, V. E., Candidate Vet. Sci.

(Shurevsky)
All-Union Institute of Experimental Veterinary Medicine
Pathology
Moscow

Sinev, N. P., Professor

Head of Chair
Leningrad Veterinary Institute
Non-infectious diseases
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Skalinskiy, Ye. I.

(Skalinsky)
Chief
Virus Laboratory
State Scientific Control Institute for Veterinary Preparations
Pathology; electron microscopy
Moscow

Skarbilovich, T. S. (woman), Candidate Biol. Sci.

Chief
Laboratory for Study of Plant Nematodes
All-Union Skryabin Institute of Helminthology
Moscow

Skorin, I. Ye., Candidate Vet. Sci.

Foot and Mouth Disease Laboratory
All-Union Institute of Experimental Veterinary Medicine
Moscow

Skryabin, K. I., Academician

(Skriabin; Skrjabin)
Vice-Chairman
All-Union Academy of Agricultural Sciences
Professor of Helminthology
Moscow Veterinary Academy
Founder
All-Union Skryabin Institute of Helminthology
Moscow

Smirnov, A. N.

Assistant Chief
Microbiology Laboratory
All-Union Institute of Experimental Veterinary Medicine
Moscow

Sofiyev, B. I.

(Sofiev)
Kazakh Ministry of Agriculture
Control Laboratory
Alma-Ata Biocombine
Veterinarian
Alma-Ata

Sokhadse, Enza

Intourist Interpreter
Tbilisi

Spesivtseva, N. A., Professor (woman)

Mycology Laboratory
All-Union Research Institute of Veterinary Sanitation and Ectoparasitology
Mycotoxicology
Moscow

Staroverov, N. A., Candidate Agric. Sci.

Head
Department of Agricultural Sciences
Kharkov Research Institute of Animal Husbandry of Forest, Steppe, and Woodland Regions of the Ukrainian S.S.R.
Zootechnic
Kharkov

Studentsov, K. P., Dr. Vet. Sci.

(Studentzov)
Chief
Brucellosis and Tuberculosis Laboratory
Kazakh Veterinary Research Institute
Alma-Ata

Syurin, V. N., Professor

(Siurin)
Director
State Scientific Control Institute for Veterinary Preparations
Virology
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Tolstova-Pariyskaya, N. G., Professor, Dr. Vet. Sci.

Head of Chair
Department of Pathologic Anatomy
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Kharkov

Trilenko, P. A., Professor, Dr. Vet. Sci.

Chief
Department of Microbiology
Leningrad Veterinary Research Institute
Genital infections of cattle
Leningrad

Tsvetaeva, N. P., Candidate Vet. Sci. (woman)

(Tsvetayeva)
All-Union Skryabin Institute of Helminthology
Pathogenesis of helminths of livestock
Moscow

Tumour, ?. ?.

District Veterinary Examiner
Leningrad

Tursunov, S. T.

Head
Department of Sheep Husbandry
Agricultural Institute imeni Skryabin
Frunze

Ulasevich, P. S.

Assistant Chief
Brucellosis Laboratory
All-Union Institute of Experimental Veterinary Medicine
Moscow

Umaraliyev, T.

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Vice-Minister
Kirgiz Ministry of Agriculture
Veterinarian
Frunze

Ushenko, ?. ?.

(Uschenko)
Artificial Insemination Laboratory
Kharkov Research Institute of Animal Husbandry of Forest, Steppe, and Woodland Regions of the Ukrainian S.S.R.
Kharkov

Vasadze, E. I., Candidate Vet. Sci.

Head of Chair
Department of Parasitology
Georgian Zooveterinary Institute
Parasitologist
Georgian Research Institute of Animal Husbandry and Veterinary Science
Tbilisi

Verteletskiy, L. L. (1910)

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Veterinary Administration
Russian Soviet Federated Socialist Republic
Moscow

Vertinskiy, K. I., Professor

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Pathology
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Veselova, T. P. (woman), Candidate Vet. Sci.

All-Union Skryabin Institute of Helminthology
Pharmacology
Moscow

Voloskov, P. A., Professor

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All-Union Institute of Experimental Veterinary Medicine
Pathology and physiology of reproduction
Moscow

Vsevolodov, B. P.

Alma-Ata Zooveterinary Institute
Pathology
Alma-Ata

Yatsenko, A. Ye., Professor

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Kharkov Research Institute of Animal Husbandry of Forest, Steppe, and Woodland Regions of the Ukrainian S.S.R.
Specialist in cattle breeding
Kharkov

Yel'tsov, S. G., Professor

(Eltsov)
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Department of Surgical Academy
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Yerkomayshvili, ?. ?., Academician

(Erkomaishvili)
Georgian Research Institute of Animal Husbandry and Veterinary Science (?)
Animal Husbandry
Tbilisi

Yershov, V. S., Professor, Dr. Vet. Sci.

(Ershov)
Director of Institute
Chief
Laboratory of Swine Helminths
All-Union Skryabin Institute of Helminthology
Moscow

Zaytsev, N. V.

(Zaitsev, N. W.)
Chief
Veterinary Department of Fair Exhibits
Director of Polyclinics
All-Union Agricultural and Industrial Exhibition
Moscow

Zhunkovskiy, I. E.

Agricultural Institute imeni Skryabin
Frunze

Zinov'yev, V. S. (B. S.?)

(Zinoviev)
Assistant Chief
Veterinary Department
Kazakh Ministry of Agriculture
Alma-Ata

Zotov, A. P., Professor

All-Union Institute of Experimental Veterinary Medicine
Virology
Moscow

OBSERVATIONS PERTAINING TO AGRICULTURE

Agriculture in the Soviet Union presents a picture of contrasts. For example, it is not at all uncommon to see large, perhaps 16- to 20-foot combines, in fields combining grain, and in the same field women equipped with wooden rakes and forks using oxcarts to haul the straw onto piles. Also, the quality of animals varies greatly. Assuming we were shown some of the best livestock in the Soviet Union, we did not observe many animals that appeared to be equal in quality to the best breeding stock in the U.S.A. From our automobiles we saw many privately owned animals that appeared to be equal in quality to those on state and collective farms. We saw many poorer quality animals, too. The cattle kept for milk on state or collective farms were about average in producing ability. Average annual production ranged from 6,500 to 12,000 pounds. On the two collective farms we visited, average annual production was given as between 8,000 and 9,000 pounds. To increase the butterfat content of milk is one of the principal breeding objectives. The butterfat content now ranges from 3 to 4 percent. Cattle are bred as dual-purpose animals, and emphasis is put on size and fleshiness, even among those bred primarily for milk production.

The same general statement applies to the swine observed on state and collective farms. The principal breed is the Large White, a large, long type of hog reported to produce large litters and to wean a high percentage of the pigs farrowed. Based on observations of pork cuts for sale and served, particularly ham, it appears that the hogs have a very heavy fat covering and that no particular effort is being made toward breeding meat-type or leaner hogs. The principal emphasis seems to be on size and large litters. Even so, on one collective farm where hogs were being fattened on a feeding floor under a roof, workers reported that the swine require 8 to 9 months to reach a weight of 100 kilograms, or approximately 200 to 220 pounds. These hogs were fed concentrated feed consisting of approximately 15 to 18 percent protein while in the fattening shed. They probably were raised on pasture until they weighed about 100 pounds.

In the sheep-raising areas, we were not able to observe sheep on range at close proximity. Most of the sheep were in the mountainous areas on summer pasture; therefore, our evaluation of the quality of sheep is based on animals at agricultural exhibits. Undoubtedly, their very best

animals were on display, and they were excellent quality. Emphasis in breeding is being placed on fine wool and meat. However, individual areas place primary emphasis on either wool or meat, according to local desires.

Since few if any cattle are kept for beef production alone, we made no observations of purely beef-type cattle. At the Moscow Agricultural and Industrial Exhibition we saw a barn-full of steers maintained in stanchions and presumably being fattened for slaughter. They were, however, the dual-purpose type and would not be considered good quality beef steers in the United States. Names and characteristics of the four dominant new breeds of cattle are:

		Average production per year	
Breed	Weight (kilograms)	Milk (liters)	Butterfat (percent)
Red Steppe	500 - 550	4,000 - 5,000	3.6 - 4.1
Black Spotted	575 - 650	4,500 - 5,500	3.5 - 3.8
Symenthal	650 - 750	4,800 - 5,800	3.8 - 4.1
Lebedinsky	600 - 700	4,300 - 5,300	3.8 - 4.15

We saw some chickens on one collective farm and saw others at agricultural exhibitions. Egg production on the collective farm was said to be 90 eggs a year per bird. The average annual egg production per hen in the Republic of Kirgizia was given as 173. The Russians have no broiler industry. Chickens are raised primarily for egg production and are slaughtered only when they have come to the end of their productive life.

Cattle, and presumably sheep, are fed almost entirely on forage. The use of concentrated feeds made of grains, beet pulp, proteins--common in the United States--is apparently seldom practiced in Russia. Much of the forage fed is in the form of grass and grain ensilage. It is fed directly from the fields or is ensiled in pit silos, either trench variety or circular. At one state farm, known as a milk and vegetable farm, the manager displayed great interest in the feeding of concentrates to increase milk production, and was very eager to get literature from the United States describing how such feeds are utilized here. At the farms visited, special mention was made of the high degree of mechanization, particularly in regard to feeding and cleaning of the pens. Even though overhead-type feed carriers were installed and utilized, there was still a great deal of hand labor in the feeding of forage. The same is true in regard to barn cleaning. We saw barn cleaners in one or two barns. They were not the type known in the United States where the conveyor removes all the manure from the gutter, but were so constructed that the manure had to be pushed to a central location by hand and then elevated from the barn. However, we did see a conventional type of cleaner at a fair.

Progress in breeding better quality livestock has probably been retarded by the Lysenko theory that the influence of environment is stronger than that of heredity. Also, the improved breeding of cattle would seem to be retarded by the apparent desire to develop what is referred to in the Ukraine as the universal-type animal--one equally good for milk and for meat production and perhaps also utilizable for draft. We did not see any animals other than large work oxen used for draft, however.

A common practice is to import purebred bulls, such as the Symenthal from Switzerland, the Holstein-Friesian from Holland, or Jersey bulls, and cross them on the native cattle. Apparently they then soon report the establishment of a new breed, to which they give a name, such as the Red Steppe, or the Kastroma, or the Russian Black-and-White. Artificial insemination is being widely used not only in cattle but also in sheep, horses, and to some extent, experimentally in swine. It is obligatory in herds where trichomoniasis and brucellosis exist.

Cattle are apparently never dehorned. All the cattle have horns, and many have rather large horns. When questioned as to why they do not dehorn, one answer was that observing the horns is a means of measuring the adequacy of the keratin in the keratin-containing parts of the body. The udders of the milk animals were small, many were poorly formed and had supernumerary teats. Apparently no effort is made to remove these extra teats.

Practically all animals--milk cows, swine, sheep, goats, geese--are herded in the U.S.S.R. We even saw men stationed with hives of honey bees up in the mountains. Women commonly serve as herders. On one large experimental farm, girls or women were herding several small groups of swine, consisting of perhaps 10 to 15 sows with their pigs, on one large pasture. On this farm good use was being made of swine pasture in the form of oats, clover,

peas, and soybeans, which were apparently all sown together and were being grazed by the sows and their pigs.

In some areas the fat-tailed sheep is still considered an important and desirable animal. In other areas, we found that they were in disrepute and every effort was being made to replace them. Breeding effort is toward the development of a fine-fleeced sheep of good size that will yield a large wool clip and produce a meaty animal for slaughter. The common practice is to slaughter the male animals as 3-year-old wethers, and, of course, the females at the time they reach the end of their productive life.

On the farms we visited we were given production figures relative to milk, butterfat, number of pigs per litter, and wool yields. Pig litters were said to average as high as 10 to 13, and the average annual pig production per sow in the Ukraine was given as 18.3. Sheep in the Ukraine were reported to produce an average of 11 pounds of wool. In Kirgizia, production was given as 1,200 pounds of wool for 240 acres of land.

The Soviet goal is to reach or surpass the average animal production in the United States for milk, meat, wool, eggs, and the like. They found it hard to believe that we had a surplus of butterfat and other animal fat and that we were directing our efforts toward the development of animals that would produce milk of a higher percentage of solids other than fat and meat animals with less fat.

At one agricultural exhibition in Kirgizia we were shown horses that were especially bred for racing. The horses were excellent quality. Apparently racing is a rather large enterprise in the Kirgizian Republic. This was also depicted in a film showing the agricultural enterprises of this Republic. The use of horses for draft purposes is not common in the areas of the Soviet Union that we visited. Most of the planting and cultivation of crops is rather highly mechanized, with tread-type tractors producing most of the power. Oxen were used for lighter work in practically all the areas we visited.

Although outside the scope of animal husbandry and veterinary medicine, we made some observations relative to the workers per hectare on the state and collective farms, the income of such workers, and their living conditions. In general, many more people are required to produce crops on cultivatable acres in the Soviet Union than are required in the United States. For example, the total area on the first of two collective farms we visited was 4,210 hectares, and 510 people were reported to be working on this farm. On the other, the total area was 1,082 hectares, of which 232 (556.8 acres) were covered by forests, 250 (600 acres) were in cultivated crops, and approximately 40 (96 acres) were in annual hay. On this farm, the total number of workers was 120.

On the first farm, which was in the Ukraine and largely cultivatable land, they were milking 202 cows and had 31 sows. We did not obtain the number of sheep. On the second farm, they were milking 120 cows and had 220 hogs and about 700 laying hens.

The mechanical equipment on the first farm was reported to be 10 tractors, 9 trucks, 1 car, 3 motorcycles, 3 corn combines, and 2 beet combines; also sowing machines, cultivators, etc.

Although apparently more people are required for the production of crops on cultivatable acres in the Soviet Union than in the United States, the number now required is probably considerably less than was required prior to collectivization and mechanization of agriculture. Furthermore, each family on a collective farm has its own plot of approximately 1 acre, which they are allowed to cultivate, and most farms allow the individual families to own a cow, probably two or more sheep, and some swine. In some areas families are allowed to graze their animals on the common holdings of the collective farm. In other areas, families are furnished a certain amount of forage for their animals as part of their wages. Workers on state farms apparently do not receive any produce as part of their wages, but are paid in cash and must purchase the foods they need. State farms appear to be established for the principal purpose of producing large quantities of badly needed foods, and are usually specialized, such as grape farms, citrus farms, milk and vegetable farms, etc. These farms are usually large--8,000 to over 100,000 acres--and have many animals on them. For example, on the two state farms we visited where milk was the principal item produced, they were milking a combined total of about 900 cows. Most of the milking is by machine, with women milkers.

CONCLUSIONS

None of the members of our delegation had ever visited the U.S.S.R. before, hence we had no first-hand "before and after" observations upon which to judge the country's progress in veterinary education, veterinary research, and control of animal diseases in recent years.

In spite of this, we were impressed with what we heard and saw. Without doubt, the Soviet Union has many first-rate scientists engaged in work in these specialties, and we cannot doubt that they have made very rapid progress in recent years. We learned relatively little of a scientific nature that was new to us. It is our conviction that the Soviets are still catching up with the Western World in these areas, but obviously they are catching up fast! This is being accomplished in part because the Government is supporting the work and pressing toward disease-control among food-producing animals as a means of improving the low living standards of the people. Those engaged in the work have been making rapid progress because they are informing themselves fully about progress in the western countries and capitalizing on this information. They are thus able to "leap frog" easily over barriers that have required years of effort on our part to overcome. The fact that traffic in animals is not as great as in the western countries, and that all livestock is owned, or strictly controlled, by the Government also make disease-control plans easier to administer than in countries where private enterprise exists.

We had no way of checking the accuracy of what we were told of the success of Soviet disease-control programs, but we saw enough to convince us that most of the more serious epizootic diseases have been brought under control, or eliminated, and that animal health in the U.S.S.R. compares favorably with that in the more enlightened countries outside the Iron Curtain.

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